University of Alberta

An Experimental Investigation of the Impact of Fat Taxes: Price Effects, Food Stigma, and Information Effects on Economic Instruments to Improve Dietary Health

by

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in

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Department of Rural Economy

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Abstract

This thesis investigates how a tax and warning label on less healthy snack food products may affect consumer behaviour when the imposition of the tax is a source of consumer information.

A survey that included choice experiments was implemented in supermarkets. Participants were asked to choose between high fat snacks, some displaying a stigmatizing warning label, and healthier snacks. Multinomial logit and latent class models exploring choice were estimated and a predictive hypothetical market was set up.

Results show that the warning label had a negative price premium of about $4. The effect of price, though small, becomes even smaller as BMI increases. A fat tax for health is not recommended because it might not hit the target population, people were not very price sensitive, and it would likely be regressive. To encourage health, it appears to be more effective to display a warning label than to apply a tax.

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Chapter 1: Introduction

1.1 Background and Problem

The purpose of this study is to explore how targeted food taxes may affect consumption decisions. A tax on a less healthy food, also know as a "fat tax," may discourage people from buying these products by raising their price relative to healthier substitutes. If the tax is highlighted by a warning on the label of the product, this could potentially stigmatize the targeted food item. Choice experiments present participants with two or more options with differing attributes. The participant is then asked to make a choice between the two products and it is assumed that they choose the option that maximizes their utility. In this study, they are used to enhance understanding on the joint effects of price changes induced by a fat tax and the stigma associated with the application of the tax, while controlling for demographics and other relevant variables. The role of stigma in influencing consumer choice is something that is not well developed in the economic literature, but is clearly relevant to a variety of policy situations. The main hypothesis of this study is that a fat tax has greater behavioural impact with stigmatizing labels than without.

The reason the consumption of certain foods should be decreased is because of the obesity epidemic. Obesity, and its vast array of associated non-communicable diseases, has been increasing in North America (WHO, 2005). An individual's body mass is affected by the energy they intake from food and the energy their body uses to perform basic functions as well as any additional energy expenditure that might be required, e.g. physical activity. An excess amount of

calories can be easily consumed by eating food that is high in calories but does not provide very much satiety. Potato chips and other comparable snacks would be a good example of this, since they are generally high in carbohydrates and fat and low in protein, since protein is the macronutrient most responsible for satiety. The reason obesity is an economic problem is because it is very costly to the health care system to treat the vast number of people who have health complications as a direct result of their obesity. For example, it is estimated that the direct and indirect economic cost of obesity in Canada during 2001 was $4.3 billion (Katzmarzyk and Janssen, 2004). If consumption of high calorie, low satiety foods can be discouraged, it may lead to a decrease in obesity, which would mean less strain on the health care system. A tax on these products, as well as a stigmatizing warning label highlighting the tax and the reasons behind it, is a potential way to decrease consumption of these products. This study examines how people respond to this strategy.

1.2 Overview

Choice modeling was chosen as way to investigate this problem. This approach is based on the assumption that when people are faced with a choice, they choose the option that will make them happiest.

Data was collected by conducting in-store surveys in supermarkets across Alberta using small portable computers. The surveys asked a series of choice questions as well as demographic and health questions. The choice experiments placed the participants in a hypothetical situation where it is mid afternoon and they are hungry and at a vending machine with two options to buy a snack. They

were presented with an option between a healthier snack food product and a less healthy snack food product. In each choice question there was also the option to choose "none," which would mean the participant chose to buy neither snack and so would continue their day hungry. Different combinations of prices were tested as well as the presence of two different hypothetical warning labels that each highlight the tax and state that it is being imposed because of the product's less healthy nutritional content.

The survey also contained a scale that measured their health locus of control by presenting them with 18 statements about health and asking them to what degree they agree with these statements. This scale measured to what extent they believed their health was controlled by themselves, others and by chance.

Once the data was collected, it was analyzed by estimating models in order to determine the effect different demographics had on the probability of a product being chosen. These model estimations were also used to investigate how people respond to price and warning labels and which products were preferred over others.

A hypothetical market was set up using the results of an estimated model. The hypothetical market simulates a store or a vending machine with 8 options for a snack food. The probability of choosing each option, i.e. market share, was estimated. Different price and warning label scenarios were simulated and the predicted market shares calculated for each scenario. Simulations were also conducted using different values for body mass index (BMI), so it was possible to

see how an obese person responds to price when compared to someone with an average BMI.

A combination of the results from all of these analysis techniques were used to make conclusions and appropriate policy recommendations.

Chapter 2: Literature Review

2.1 Fat Taxes and Thin Subsidies[1]

2.1.1 Fat taxes

There is economic evidence addressing the question of whether governments can achieve desirable dietary goals through food price interventions. Some recent studies suggest that fat taxes may be effective in reducing unhealthy food consumption. Schroeter, Lusk, and Tyner (2007) created a microeconomic model to estimate the effects of a tax on high-calorie food. They conducted empirical analysis by obtaining statistics for price and income elasticities and using energy accounting to come up with weight elasticities. One of their findings was that a tax on high calorie soft drinks would cause a decrease in weight through decreased soft drink consumption. Other researchers who have focused their studies on soft drinks have similarly found that a tax on soft drinks may effectively decrease their consumption (Gustavsen, 2005; Tefft, 2006). Tefft (2006) used a reduced form linear approximation to estimate the effect of a tax on soft drinks. He found that a tax on soft drinks may result in decreased snack food consumption and increased revenue due to increased expenditure. It is important to note that he measures expenditures rather than quantities. Richards, Patterson, and Tegene (2004) used household scanner data in a random coefficient (mixed) logit RCL model to test if rational addiction to food nutrients may be a cause of obesity. They found that a rational addiction to carbohydrates, fat, protein and sodium exists and concluded that fat taxes may be more effective than

[1] Portions of this section have been previously published. Cash, S. and R.D. Lacanilao "Taxing Food to Improve Health: Economic Evidence and Arguments." *Agricultural and Resource Economics Review* 36(2007):174-182.

information-based policies. Using a linear approximate almost ideal demand system (LA/AIDS) to simulate tax effects on intake, Santarossa and Mainland (2003) found that price increases on certain food groups may be an effective way to induce people to substitute harmful nutrients for healthier ones.

Other researchers are not as hopeful. Kuchler, Tegene, and Harris (2004) simulated health outcomes of a fat tax by using reduction in weight as a measure of health. They calculated the effects of a tax on different levels of consumer responsiveness to price. For each elasticity scenario, four possible tax rates ranging from 0.4 to 30 percent were considered. They were able to calculate reduction in caloric intake for each scenario, assuming that nothing was substituted for the salty snacks and that all food purchases are consumed. From this they calculated reduction in body weight (3500 kcal per pound of body weight). Their results show that a small tax of 0.4 or 1 percent would not significantly affect consumption or health outcomes. In later work, the same authors further estimated demand functions for potato chips, all chips and other salty snacks. Using the resulting elasticity estimates, they explored the effects of a 1, 10 and 20 percent tax on each snack category. They found that a small tax on salty snacks would not impact diet very much and even a relatively large tax would not appreciably affect the diet quality of the average consumer (Kuchler, Tegene, and Harris, 2005).

Smed, Jensen, and Denver (2005) combined econometric models of food consumption behavior in socio-demographic groups with models for conversion between food consumption and nutrient intake. They conducted simulations of

four different scenarios: a tax on all fats, a tax on saturated fats, a tax on added sugar, and a subsidy on fibers. These are taxes on nutrients rather than types of food. They found that a tax on fats would decrease fat intake but increase sugar intake while a tax on sugar would decrease sugar intake but increase fat intake. Although these tax scenarios predict a decrease in energy intake, the authors conclude that tax or subsidy alone could not solve the obesity problem. They suggest combining a tax with other regulations, such as information campaigns, since there might be an interactive effect.

Boizot-Szantaï and Etilé (2005) used data from a French food expenditure survey to model the effects of different food group prices, income, and demographics on BMI. Their results suggest that the effectiveness of a fat tax may be limited in the short-run. Clark and Levedahl (2006) used a generalized addilog demand system (GADS) to estimate a demand-characteristic system for beef, pork and poultry. According to their estimates, a tax that would increase the price of pork would increase the consumption of fat from pork and may contribute to obesity. They suggest that policies to raise income would be more effective at decreasing fat consumption.

The state of Maine had a snack tax between 1991 and 2001. Oaks (2005) used this as a natural experiment to evaluate the effect of a snack tax on obesity outcomes. The design of his project is an interrupted time series comparison group. His analysis revealed no relationship. He argued that although his study fails to support the hypothesis that a snack tax reduces obesity rates, the revenues

observed from the snack tax could have been used to support other programs that may be more effective at reducing obesity.

2.1.2 Thin Subsidies

One area of research that has not been fully explored but holds much potential is the analysis of "thin subsidies". Although such subsidies would require government outlays (which could be potentially funded through fat taxes), this money would be returned to taxpayers in the form of lower food prices. The goal is to promote a better diet by making healthier food options more accessible. In turn, lives would be saved through decreased incidence of diet related diseases, lessening the burden on the health care system. For example, Schroeter, Lusk, and Tyner (2007) analyzed several price change scenarios in their simulation analysis, and found that the most effective scenario to decrease weight was a subsidy on diet soft drinks.

Cash, Sunding, and Zilberman (2005) estimated the health potential of thin subsidies, using epidemiological evidence on the efficacy of fruits and vegetables in reducing heart disease and stroke. They ran simulations using intake and sociodemographic variables from the 1994-96 U.S. Continuing Study of Food Intakes by Individuals. Health outcomes were estimated by using dose-response functions for the protective effects of vegetables and fruits. According to their simulation, a 1% decrease in the price of vegetables and fruit could be associated with almost 10,000 prevented cases of coronary heart disease and ischemic strokes in the United States. They concluded that a thin subsidy could be an effective way to provide health benefits, especially to disadvantaged consumers.

Their estimates of the cost per statistical life saved compare favorably with the costs associated with other U.S. government programs.

Asfaw (2007) used data from a 2007 household survey conducted in Egypt, which included food expenditure. His model estimation used mother's BMI as the outcome variable, which he explained as a function of different food prices, controlling for age, male/female headed households, education, family size, urban/rural, monthly expenditure, and distance to nearest bread shop. His results imply that lower prices on healthier foods such as fruit, milk, and eggs are associated with a lower BMI and that lower prices on energy-dense food items such as sugar and oil are associated with a higher BMI. These results suggest a thin subsidy may be an effective way to decrease BMI in a developing country context.

Gelbach, Klick, and Stratmann (2007) analyzed how bodyweight is affected by the price of healthful food relative to unhealthful food. They used individual level data on obesity and demographics from the National Health Interview Survey (NHIS) for the years 1982-1996 and combined them with regional level food price data. They created price indices of healthful and unhealthful foods, and used the ratio of the two as the key regressor. They also controlled for many demographic variables such as education, race, age, and region. Their regressions show a significant, positive relationship between the relative prices of healthful foods and BMI. Furthermore, their analysis suggested that this is a causal relationship. Although the relationship was statistically significant, the coefficients were modest. On balance, this study suggests that a

tax on unhealthful foods or a subsidy on healthful foods would cause a decrease in bodyweight, but not an economically significant one.

In the public health and dietetics literatures, Simone French and colleagues have reported several experimental studies involving environmental interventions (French, Jeffery, Story, and Snyder, 1997; French, Story, Jeffery, and Snyder, 1997; French, Jeffery, Story, Hannan, et al., 2001; Jeffery, Pirie, Rosenthal, Gerber, et al., 1994). French, Jeffery, Story, and Snyder (1997) set up environmental interventions to determine the effects of pricing strategy on fruit and vegetable purchases in school cafeterias. They made fruit, carrots and salad in each school cafeteria about 50 percent cheaper during the intervention period and advertised these new prices. During the intervention period fruit sales increased by about four fold and carrot sales approximately doubled. Salad sales were not significantly different. With the increased sales from lower prices, sales revenue was not significantly reduced. This study suggests that decreasing the price of fruits and vegetables with minimal promotion may be an effective way to increase sales of these items to high school students (French, Jeffery, Story, and Snyder, 1997). Jeffery, Pirie, Rosenthal, Gerber, et al. (1994) conducted a similar experiment in the cafeteria of a university office building. In addition to reducing the prices of fruits and vegetables they increased the selection. The results suggest that increasing selection and decreasing the price of fruits and vegetables may be an effective way to increase the amount of fruits and vegetables adults purchase (Jeffery, Pirie, Rosenthal, Gerber, et al., 1994).

French, Jeffery, Story, Hannan, et al. (2001) used an experimental design to determine the effects of decreasing the price of low-fat snacks relative to regular snacks in vending machines. Four levels of pricing were examined. They found that a 10 percent decrease in price of low-fat snacks increased the percentage of snacks sold that were low fat without increasing sales volume, which suggests that customers may have been substituting low-fat snacks for regular snacks. This is a positive result from a public health perspective. Decreasing the price of low-fat snacks by 25 or 50 percent caused an increase in sales volume, which suggests that consumers may be buying more snacks from the vending machine, which could imply a negative net health outcome. Another possibility is that more consumers were attracted by the price decrease to those particular vending machines used in the study. It is difficult to evaluate the overall efficacy of these interventions because it is not known how the consumers ate throughout the day. An interesting finding of the last study is that lower prices on low-fat snacks were not associated with smaller profits, suggesting that this may be an inexpensive intervention (French, Jeffery, Story, Hannan, et al., 2001). Environmental interventions in a restaurant setting have yielded similar positive results (Horgen and Brownell, 2002).

2.1.3 Distributional Effects

A common concern is that fat taxes may be regressive. In the simplest form of the argument, it is probably sufficient to note that low-income consumers spend a larger portion of their income on food, so that any policy that broadly raises food prices will have the greatest relative impact on poor households. Food

energy price studies, such as the one conducted by Drewnowski and Specter (2004), have indicated that there is a huge gap between the cost per calorie of energy-dense, nutrition-poor (EDNP) food items such as sugar and healthier food items such as vegetables and lean meats. For 56 food items across a sample of 20 Edmonton supermarkets, a ten-fold difference in the price per energy unit of fish and poultry ($18.82 CND/1000 KCal) compared to the price of fats, sugars and oils ($1.42 CND/1000 KCal) was observed. Across individual food items, there was approximately a sixty-fold difference in energy cost between turkey slices ($25.79 CND/1000 KCal) and sugar ($0.44 CND/1000 KCal) (Cash and Lacanilao, 2007). If one accepts that meeting basic energy needs will come before other nutritional concerns, this vast difference in food energy prices suggests that at least for the lowest-income consumers, there is already considerable price pressure to buy EDNP foods. In this context, raising the prices of precisely those foods that provide food energy at the lowest cost is very likely to be regressive.

This premise was also examined by Leicester and Windmeijer (2004), who used data on dietary intake and household income from the 2000 U.K. National Food Survey to investigate how macronutrient intake varies across the income spectrum. Their analysis suggests that a flat tax targeting fat, sodium, and cholesterol would have an effective tax rate of 0.7% for the poorest consumers, but only 0.25% for those at median income, and as little as 0.1% for the wealthiest households. Another study, investigating a tax on fat content in dairy products,

similarly found that such a tax would be regressive in nature (i.e., the elderly and poor would suffer the greatest welfare losses) (Chouinard et al., 2007).

Other studies have indicated that policies designed to make a healthy diet more affordable may be most effective among those with lower socioeconomic status (Darmon, Ferguson, and Briend, 2002; Cash, Sunding, and Zilberman, 2005). In contrast, Gustavsen and Rickertsen (2004) found that households that consume high amounts of vegetables are more sensitive to vegetable price than low-consuming households, suggesting that a thin subsidy on these products may nonetheless have the greatest benefit to high-income consumers.

2.2 Stigma

Stigma, as defined by Fischoff (2001), is "demonstrated by *principled refusal to engage in an act that would otherwise be acceptable*" (Flynn, Slovic & Kunreuther, 2001, p. 361). Someone who would normally buy a food product might choose not to if the product displayed a warning label. This is an example of the stigma that might be associated with warning labels on less healthy food products.

Stigma associated with warning labels has been studied. An example is the type of warning label found on cigarette packages. Thrasher, Rousu, Anaya-Ocampo, Myriam Reynales-Shigematsu, et al. (2007) investigated the demand for cigarettes with a graphic warning label compared to a text-only warning label. They conducted an experimental auction on adult smokers in Mexico where participants were asked to place separate bids on cigarette packages. One package contained the graphic warning label while the other displayed the text-

only warning label. They found that people were willing to pay 17% less for the packages with the graphic warning label than the packages with the text-only warning label. This study shows that graphic warning labels would likely decrease the demand for cigarettes in Mexico.

Being seen purchasing something may induce stigma onto certain products. For example, people may not want to be seen buying the less healthy snacks – especially if they have a warning label displayed. Argo, Dahl, and Manchanda (2005) conduct experiments to determine the effect that a social presence has on purchasing behaviour. They sent university students to a store to buy batteries. Students who were in the presence of three or more other people usually bought the most expensive, name brand batteries while those who were by themselves often bought the cheaper, less popular brand. This study suggests that being seen while making a purchase may contribute to the stigma behind buying certain products.

The stigma associated with government programs to aid low-income families has been studied (Stuber and Kronebusch, 2004; Levinson and Rahardja, 2004). Stuber and Kronebusch (2004) attempted to explain the low participation rates in Temporary Assistance to Needy Families (TANF) and adult Medicaid programs. They interviewed patients at community health centers in the United States with incomes below 300 percent of the federal poverty level and at least one child in the household. Scales were created in order to measure stigma, enrollment barriers, and knowledge. The questions were asked in an indirect way in order to get more reliable responses. They found that there are two types of

stigma: identity stigma, which is the concern about "being labeled by welfare stereotypes," and treatment stigma, which is concern about "poor treatment during the application process" (Stuber and Kronebusch, 2004, p. 526). They measured these two types of stigma separately using a questionnaire. They found that treatment stigma, perceived enrolment barriers, and lack of knowledge were the main reasons for low enrollment (Stuber and Kronebusch, 2004).

Levinson and Rahardja (2004) used the National Survey of America's Families (NSAF) to determine if the low enrollment in Medicaid could be a result of welfare stigma. This survey contains eight questions related to welfare stigma. They found that those who were not enrolled in Medicaid answered the questions in such a way that displays welfare stigma. This analysis suggests that welfare stigma and enrollment in Medicaid are related, but it is not enough to show causality. In the second section of their analysis, Levinson and Rahardja (2004) used a utility-maximizing framework. They predicted a Moffitt (1983) utility function with fixed and variable stigma for Medicaid and Food Stamps. According to this model, if there is a fixed stigma, participation rate will increase with benefit. If there is no fixed stigma, participation will not depend on the benefit. They find that increases in benefits of the programs substantially increases participation. This means that there is a fixed cost, which might be fixed stigma. This paper demonstrated two different approaches to examining stigma and participation: using surveys to evaluate perceptions of programs and using a utility-maximizing framework (Levinson and Rahardja, 2004). Currie and

Grogger (2000) use a third approach. They indirectly measure the presence of stigma using proxy variables (cited in Stuber and Kronebusch, 2004).

The stigma related to the discovery of hazardous waste and its cleanup has also been studied (Messer, Schulze, Hackett, Cameron, et al., 2006; Patunru, Braden & Chattopadhyay, 2007; McCluskey and Rausser, 2003). Messer, Schulze, Hackett, Cameron, et al. (2006) analyzed the benefits of the hazardous waste cleanup known as Superfund. They looked at the effect that delayed clean-up had on property values in communities neighboring Superfund sites. They developed a model that predicts the movement in time of the ratio of the property values of homes close to the Superfund site compared to homes far enough away to avoid being negatively affected. Their psychological/economic model shows that discovery, beginning of clean up, and any event related to the hazardous waste increases the fraction of homeowners and potential buyers who shun the neighboring communities. They used their predicted coefficients to run a simulation with four different scenarios with varying number of events (announcement, clean up, delivery, etc.) as well as varying the amount of years it takes to clean up. Their results suggest that quicker cleanup and fewer stigmatizing events would reduce the loss of property value due to people shunning neighboring communities.

Patunru, Braden and Chattopadhyay (2007) used a latent segmentation model to estimate the benefits of the clean-up of hazardous waste in Waukegan Harbor, Illinois. It was declared a Superfund site. They conducted a choice experiment where residents of Waukegan Harbor were asked to think back in time

to their last house purchase and to choose between their current house and hypothetical houses differing in certain attributes, including pollution of the harbor. They also asked if they thought the harbor was environmentally safe at the time of purchase. They used this information in their latent segmentation model to estimate Waukegan residents' willingness to pay for clean-up, which is an indication of the stigma associated with the site (Patunru, Braden & Chattopadhyay, 2007).

McCluskey and Rausser (2003) used a standard multiple-equilibrium Hedonic model to analyze the economic consequences of stigmatization from a hazardous waste site. They used a data set of 205 397 observations of homes sold from 1979 to 1995 in Dallas County, Texas. They used a Geographical Information Systems (GIS) database so the distance between each house and the hazardous waste site, airport, and mall could be calculated. They found that if there is a recovery and the waste is cleaned up, there is just a temporary drop in property values (temporary stigma). They found that there is long-term stigma only within a ~1.2-mile radius around the source of the hazardous waste (McCluskey and Rausser, 2003).

The stigma surrounding fish consumption advisories when dealing with contaminants, such as mercury in fish, has also been studied (Shimshack, Ward & Beatty, 2007; Jakus and Shaw, 2003). Shimshack, Ward, and Beatty (2007) used parametric and nonparametric methods to examine the consumer response to an advisory by the Food and Drug Administration (FDA) in the United States that recommended at-risk individuals to limit fish consumption due to contamination

with mercury. The educated and well-read at-risk individuals reduced their intake of fish; however, some consumers that were not considered at-risk also reduced their consumption (Simshack, Ward, & Beatty, 2007). This could indicate a stigma behind these fish consumption advisories. Jakus and Shaw (2003) estimated a model for consumers' endogenous risk perceptions about products and applied it to recreational fishing. They found that the perception of hazards associated with fish consumption advisories affect recreational site choice as well as welfare (Jakus and Shaw, 2003).

2.3 Choice Experiments and Food Purchasing Behaviour

Choice experiments present the participant with a set of choices and ask them to choose an option. Choice experiments can be very useful because it is possible to incorporate products that do not exist. Also, attribute levels (e.g. price) can be varied to levels that are not observable on the market.

There are several recent studies that use choice experiments to analyze food purchasing behaviour. Often, these choice experiments are hypothetical, meaning that there is no actually product being bought and sold. Loureiro and Umberger (2007) used choice experiments to analyze consumers' preferences and willingness to pay for country-of-origin labeling, farm traceability, and food safety inspections when purchasing steaks in the United States. Each of these attributes is represented by a label on the steak product packaging. They also included tenderness and price of the steak as attributes in the choice experiment. They estimated a multinomial conditional logit model and use ratios of the attribute coefficient over the price coefficient to estimate willingness-to-pay for

each attribute. Their results show that consumers were willing to pay the most for a steak with a label guaranteeing that it was inspected by the USDA, Food Safety Inspection Service (Loureiro and Umberger, 2007). Goldberg and Roosen (2007) compared the contingent valuation method with choice experiments. The contingent valuation questions were dichotomous choice questions that asked participants how much they were willing to pay for varying levels of food safety when buying chicken breasts. Each respondent was also given eight choice sets. They used a random utility model to analyze the results of the choice experiment. They found that the choice experiments resulted in higher values of willingness-to-pay for attribute packages (Goldberg and Roosen, 2007). Carlsson, Frykblom, and Lagerkvist (2007) conducted a choice experiment on Swedish consumers. They analyzed consumer behaviour when buying chicken and beef. They included several attributes such as herd living conditions (indoor or outdoor), transport, slaughter, and price. The attribute of interest was the animals' fodder. It could be non-genetically modified, genetically modified, or there could be a ban on genetically modified foods in the European union and so it is obviously non-genetically modified. They used a random parameter logit model to analyze the responses. They found that consumers preferred the non-genetically modified food and that there was no significant difference between their willingness to pay for a ban on genetically modified food when compared to a mandatory labeling system where genetically modified foods are allowed but must be labeled (Carlsson, Frykblom, and Lagerkvist, 2007).

Some choice experiments are nonhypothetical. An advantage of nonhypothetical experiments is that the participants may be encouraged to answer the survey truthfully, since they will actually be paying for the product and taking it home at the end of the experiment. A disadvantage is that the product must actually exist with the stated attributes. Non-existing attribute levels may still be included. For example, a label that does not exist in real life can be created and displayed with a product. Also, price levels that you would not see on the market can be tested. Lusk and Schroeter (2004) compare responses from a hypothetical choice experiment to that of a nonhypothetical choice experiment. The only difference between the two treatments was whether the payment was actually required at the end of the session or not. They used beef steaks as the product in their experiments. Five steaks with varying prices were presented at each question. This is different than most of the other choice experiments, which had a choice between only two products per question. They used multinomial logit models to analyze their data. They found that the willingness-to-pay values were larger for the hypothetical group. This makes sense, since people would generally be more careful about their decisions when real money is involved (Lusk and Schroeter, 2004). Nayga, Woodward, and Aiew (2006) use a nonhypothetical choice experiment to analyze consumers' willingness-to-pay for safer meat through irradiation. Information about irradiation techniques and effectiveness were given to each participant before making the choices. The setting was made as real as possible by having the meat available for viewing and using real cash for the transactions. They developed single-bounded and one and one-half

bounded models. They found that the cost of irradiating the meat was less than the premium their respondents were willing to pay for irradiated ground beef.

2.4 Point-of-Purchase Health Information and Demand for Food

2.4.1 Promotional Signage in Cafeterias or Vending Machines

Considering the efficacy of health promotion in cafeterias and on vending machines is important because many people eat at these types of places on a regular basis because of convenience. For example, if your school or work has a cafeteria it is more convenient to eat there for a lunch break or to buy a snack from a hallway vending machine rather than leaving the building to search for food elsewhere. This is a possible way to effectively target an intervention at school-aged children to prevent childhood obesity.

Cinciripini (1984) conducted an intervention in a university cafeteria. He encouraged people to choose healthier food through a labeling system. All fresh vegetables, legumes, grains, low-fat cheeses, skim milk, vegetable soup, fruit juice, fresh fruit, cottage cheese, salads, and broiled/bakes chicken, fish, and turkey without sauces or gravies were marked on the menu with a green triangle. Leaflets were handed out encouraging people to choose green triangle foods for their nutritional value and because they are low-fat and low-calorie. Overall, the labeling strategy did not seem like it had a clear effect on food choice. However, he found that the labeling strategy increased vegetable/soup/fruit/low-fat dairy consumption in obese people. It also decreased the consumption of red meats among lean males and carbohydrates among females with a normal body composition. He observed that males require concrete incentives while females

may be sensitive to both informational and incentive approaches. This study demonstrates that health labeling may encourage certain groups of people to make healthier food choices. A study by Davis and Rogers (1982) had more promising results. They held their study in a college dormitory cafeteria and found that providing nutrition information on a sign and/or nutrient display cards positively influenced the students' milk choices.

Mayer, Heins, Vogel, Morrison, et al. (1986) conducted an intervention in a cafeteria. During the intervention phases they set up a large poster at the beginning of the food line. This poster identified low fat food as cholesterol lowering, leading to a healthier heart. The poster included the names of the low-fat entrées available that day. The study design was: Baseline 1, Intervention 1, Baseline 2, Intervention 2. Intervention 1 increased purchase rate of low-fat entrées by 85% compared to Baseline 1. When repeated it showed a smaller increase. Their results show that health information may have caused an increase in low-fat entrée sales but they mention that the long term efficacy of such treatments still has to be evaluated.

Sproul (2003) conducted a test in an Army cafeteria to determine the effect of point-of-purchase nutrition labeling on meal selections. They used lunch sales data from a computerized cash register. The intervention consisted of labeling the healthier, target items with a red lightning bolt encased by a blue square as well as calorie, fat, and cholesterol information. Large posters saying "It's a sure sign you're eating better" along with the lightning bolt were hung on walls at the entrance to the serving area. Also, a week before the intervention, a

poster and one-page flyers were stationed at the entrance to the dining facility. These materials explained the upcoming program. The intervention was implemented after a 12-month baseline measurement period. Data were collected during two 30-day postintervention periods. The results show no significant difference of mean sales of targeted entrées or proportion of targeted entrée to total entrée sales between the baseline period and the two intervention periods. Questionnaires were distributed during the lunch to collect demographic information. Questions about factors affecting meal decisions and their reaction to the promotional materials were also asked. About 60% of those who filled out the questionnaire noticed the promotional materials. 79% reported that the presence of the promotional materials had no influence on their meal choice and 75% reported that the materials had no positive effect on their attitude about nutrition. Customer meal choice was influenced more by taste, appearance, and quality than by calorie content, fat content, and price. This study shows that nutrition information did not influence consumer behavior in an Army dining facility. These results should not be generalized to the civilian population since the sample here is not representative of the general public.

Dubbert, Johnson, Schlundt, and Montague (1984) conducted their experiment in a cafeteria near a large medical center. The label for low calorie items said "LOWER CALORIE SELECTION," and was placed beside the foods. They also made a poster that said "'FOR YOUR INFORMATION, WE HAVE LABELED SOME LOWER CALORIE ITEMS. . . . Watch for these signs' (one of the [lower calorie] identifying labels was attached)" and posted it near the

cafeteria entrance. Entrées, vegetables, and salads were selected for labeling. Cash register data showed sales. The design was: "baseline 1, label vegetables, label vegetables and salads, label vegetables, salads, and entrees; and baseline 2." The results show that promotional labels on low calorie vegetables and salads increased their sales but labels on entrées did not affect their sales. Total calories of those interviewed were not affected by the intervention. The researchers came up with several possible explanations for the lack of decreased calories. Overall, this study shows that labeling at the point-of-purchase can encourage people to choose lower calorie food choices in terms of vegetables and salads.

French, Jeffery, Story, Breitlow, et al. (2001) used an experimental design to determine the effects of pricing and promotion of low-fat snacks relative to regular snacks in vending machines. Three levels of promotion were examined: no signs, signs labeling low-fat snacks, and signs labeling low-fat snacks combined with signs placed on vending machines encouraging a low-fat snack choice. They do not describe these signs in detail but I think that the signs encouraging a low-fat snack choice probably mention that the low-fat choices are healthier. They also tested location (workplace or school) and different pricing. Total number of low-fat snacks sold, profit per machine, and sales volume did not differ significantly by promotion level. They found that the percentage of low-fat snacks sold in the label-plus-sign conditions was significantly larger than the no-label condition, indicating that the health promotion may have caused some people to lower their fat intake. However, it is difficult to evaluate the efficacy of these interventions because it is not known how the consumer will eat the rest of

the day. They may eat a high-fat food later in the day to compensate for the low-fat food choice, continue to eat low-fat foods for the rest of the day, or make no additional dietary changes.

Although these studies show mixed results, it is apparent that promotional signage in cafeterias and vending machines may be able to influence people to make healthier dietary choices.

2.4.2 Promotional Signage in Grocery Stores

Since lots of people buy much of their food from a grocery store, it is important to study the efficacy of signage promoting healthier food choices in grocery stores.

Kristal, Goldenhar, Muldoon, and Morton (1997) set up a supermarket intervention. The intervention consisted of promotional flyers with a 50 cent coupon towards the purchase of any fruit or vegetable, promotional signage, and consciousness raising activities such as food demonstrations and nutritional signage. Their results show no difference in the percentage of shoppers buying fruits or vegetables (70%) between control supermarkets and those given the intervention. They concluded that more powerful interventions should be implemented to make a difference. In this case it seems like nutritional signage did not work to increase sales of fruit and vegetables but it is difficult to come to any conclusions about the effect of information alone since the intervention also included a price incentive.

Jeffery, Pirie, Rosenthal, Gerber, et al. (1982) conducted a rigorous study to try to influence knowledge and product sales by point-of-purchase health

information. Interventions took place in four supermarkets with four supermarkets acting as controls. The weekly sales of 25 items were compared over a 9-month period of time. The intervention consisted of a "display of large posters, shelf signs, and brochures, in three waves, throughout the dairy sections of the experimental stores." These contained messages that attempted to encourage healthier choices, such as "Sherbet is an excellent low-fat dessert." The information was delivered in three waves, lasting for a total of 24 weeks. After this intervention, there was no sign of knowledge increase through pre- and post-intervention surveys. Most importantly, there was no significant increase in the sales of the healthier foods being promoted. Several other health information interventions conducted in grocery stores also show no increase in sales of healthier food (Ernst, Wu, Frommer, Katz, et al., 1986; Olson, Bisogni, and Thonney, 1982; Rodgers, Kessler, Portnoy, Potosky, et al., 1994).

It seems like the techniques tested so far to attempt to increase the demand for healthier food in grocery stores through health information interventions have been unsuccessful. More research has to be conducted to find a successful technique.

2.2.3 Interventions in a Restaurant Setting

Food is readily available at restaurants. Many people eat at restaurants to socialize or to avoid cooking and cleaning. If health information or nutrition information on menus can influence consumers to choose healthier foods, this could be an effective way to improve the health of the general public, especially those who frequently eat food away from home.

Kozup, Creyer, and Burton (2003) conducted three experiments to address the effects of health claims and nutrition information on packaged food products and items on restaurant menus. Study 1 focused on a packaged food product (a microwavable frozen lasagna dinner) while Study 2 focused on a restaurant menu item (a lasagna entrée). Other than this, the conditions of the experiments were the same (same serving size, description, fictitious brand name, etc.). They presented just the feature item. They "used a 2 (inclusion or exclusion of a heart-healthy claim) × 3 (nutrition information level with control [no information], unfavorable, or favorable conditions) between- subjects design in both Studies 1 and 2." Favorability of conditions was determined by pretests in the form of surveys (favorable: lower fat content, unfavorable: higher fat content). The heart-healthy claim stated "A diet low in saturated fat and cholesterol may reduce the risk of coronary heart disease," also indicated by a heart-shaped symbol. They mailed panel members packages with stimuli for Study 1 or 2 and a survey with questions of general interest. Results from Study 1 show a favorable influence of the health claim on nutrition attitude. They also show a decrease in the perceived risk of heart disease and stroke as a result of the health claim. Favorable nutrition information positively affected consumer evaluations and reduced the perceived risk of disease. Yet, the health claim and nutrition information did not interact to influence consumer evaluations or perceived credibility. Study 2 results show that the health claim reduced perceived likelihood of heart disease and stroke but did not affect the influence of attitudes toward the product, nutrition attitude, or purchase intentions. Favorable nutrition information caused a positive effect on

the dependent measures while unfavorable nutrition information had a negative effect. It also showed that the effect of the health claim depended on the presence of nutritional information. Study 1 can be used to answer the previous question about the effect of health information on consumer behavior in grocery stores, since this is where consumers read labels.

Study 3 by Kozup, Creyer, and Burton (2003) "was a between-subjects experiment that used a 2 (inclusion or exclusion of a heart-healthy claim) × 3 (nutrition information level with control, unfavorable, or unfavorable conditions) × 3 (nutritional context, or the nutrient levels of the nontarget menu items, with control, healthy, and unhealthy conditions) design." In contrast to the first two Studies, Study 3 presented three menu items rather than just a single entrée. Also, rather than through mail, participants were recruited at a mall. Results show that the health claim favorably influenced nutrition attitude and purchase intention and decreased the perceived likelihood of heart disease and stroke. It did not affect attitude toward the product. Favorable nutrition information was associated with more positive nutrition attitudes and lower perceptions of disease risk when compared with unfavorable nutrition information. The health claim did not interact with the provision of nutrition information, and this interaction did not have a significant effect on source credibility. The results also support the hypothesis that if "nutritional content of [the] alternative menu items is unhealthy, consumer evaluations of the target product will be more favorable and perceptions of disease risk will be lower compared with when the context is healthy." Also, the nutritional context in which a food is evaluated (healthy/unhealthy) moderated

the effects of the nutrition information and the effect of the health claim on perceived source credibility. Kozup, Creyer, and Burton (2003) conclude that health claims can be effectively used as a promotional tool in restaurants and on packaged food products. Also, a favorable Nutritional Facts panel has stronger effects than the health claims on purchase intentions and product attitudes. Health claims and favorable Nutritional Facts panels may be an effective way to promote the purchasing and consuming of healthier food.

Horgen and Brownell (2002) conducted interventions in a restaurant setting. The target items on the menu were a healthy, low-fat chicken sandwich, a chicken salad, and a soup cup and bowl. They also tracked sales of corresponding control items that were not as healthy. The design consisted of six periods: an initial baseline, a price decrease intervention, an interim baseline, a health message intervention, a combination price decrease and health message intervention, and a final baseline. A one-way analysis of variance (ANOVA) showed that average daily sales did not vary by period. Further analysis showed that sales of target items increased during intervention periods when compared to baseline periods. The price decrease alone was more effective in promoting chicken sandwich and chicken salad sales while the combination treatment was more effective in promoting soup cup and bowl sales. In each case, price decrease and combination interventions were more effective than the health message intervention. For the chicken sandwich and chicken salad price decrease alone was more effective than the combination intervention. Their results indicate that health information may compromise the effect of a price intervention. They

explain that it may be because people value taste over everything else and they feel that if a food is made healthy it is likely that taste was sacrificed.

Burton, Creyer, Kees, and Huggins (2006) conducted two studies. The first study was a survey of consumers. The survey asked participants to estimate calorie, fat, saturated fat, and sodium levels of nine entrées often served in restaurants and compared these with objective values from laboratory tests. Results showed that participants underestimated the calorie content of less-healthful items by 642 kcal on average; this is about half of the objective value. They underestimated the calorie content of cheese fries with ranch dressing by over 2000 kcal on average; the objective value being 3010 kcal. The calorie content of more-healthful items was underestimated just by a little bit. Also, the nutrient levels (fat, saturated fat, and sodium) were less consistent with the objective levels for the less-healthful items than the more-healthful items.

For the second study, Burton, Creyer, Kees, and Huggins (2006) conducted an experiment. The purpose of the experiment was to study the potential public health benefits that could result from providing nutritional information at restaurants. Participants were mailed packages containing one menu stimuli and a survey of general interest. They were asked to estimate the likeliness of gaining weight and developing heart disease if each food item was individually included as part of their regular diet. It had a 3 (nutrition information: *i.* calories fat, saturated fat/trans fats, and sodium levels, *ii.* calorie, *iii.* none) × 2 (daily value information: *i.* fat, saturated fat, and sodium, *ii.* control) × 4 (menu item) mixed experimental design. "The nutrition information and daily

value manipulations are between-subjects factors and menu item is a repeated-measure factor." Results show that adding calorie and nutrient information on restaurant menus affected attitudes, intentions, and choices. Less-healthful items that had their calories and nutrient contents (fat, saturated/trans fat, sodium) underestimated (hamburger platter and chefs salad) had a decreased purchase intention when objective nutrient information was revealed. Without the nutritional information, the turkey, chicken, and chef's salad items had the same perceived likelihood of heart disease but when the calorie and nutrient information were given there was a larger difference in disease-risk perceptions. These studies by Burton et al. (2006) show that, on average, people underestimate the calorie content of less-healthful restaurant food and providing the nutrition facts diminishes their preferences for these less-healthful items. Since people eat lots of food away from home, providing calorie and nutrient information for entrées in restaurants could be an effective way to decrease the amount of less-healthful food choices. This paper builds upon a previous study by Burton and Creyer (2004), which had similar methods and results as the second study.

Colby, Elder, Peterson, Knisley, et al. (1987) conducted their study in a family-style restaurant. They tested the effect of three different messages used to promote food specials:

1. Emphasis on the healthiness of the specials – they are low in fat, sodium, and cholesterol.
2. Emphasis on flavor of the special, but also added that the choice was healthful.
3. No emphasis. Just mentioned that there was a daily special.

The results of this study show that customers chose the healthful specials when the message emphasized flavor and mentioned that the choice was healthful. This may be because people care firstly about the taste of a food, and they are especially happy when they find out a good tasting food is healthy. However, when told only that a food is healthy, they may assume that some taste was sacrificed for the healthiness.

Wagner and Winett (1988) conducted their experiment in two fast food restaurants. Their intervention included two posters that read "Be Fit & Healthy; Eat a low-fat SALAD as your meal or add a side salad" and included a picture of a salad. These were placed near the cash registers. Small cards with the same message were placed on each table. Near the entrance they placed a banner that said "Eat Salads." They monitored sales through the cash register. The design consisted of a three week baseline period, a three week intervention period, a second baseline period, a second intervention period, and a follow up phase. Results show increased salad sales during the intervention periods. This increase was greater for side salads than for salad bar sales. A cost analysis showed that fast food restaurants may be able to profit from health promotion efforts. The large increase in salad sales is good for health, since increased vegetable intake is associated with a decreased risk of heart disease.

These studies collectively show that interventions in the form of nutritional information or health claims on menus as well as promotional signage could influence consumers to make healthier decisions about what food to buy. When promoting a healthy food, perhaps emphasis should be put on the great

taste with the healthiness mentioned as well. Restaurants can potentially profit from these health promotion efforts.

Chapter 3: Methods

3.1 Theory: Choice Modelling

People make choices based on a number of factors and their preferences. It is assumed that they are rational and will make the decision that will maximize their utility.

Utility (denoted as U_i) is assumed to have an observed component (V_i) and an unobserved component (ε_i). An additive relationship between the two components is assumed (Hensher, Rose, and Greene, 2005, p. 75).

$$U_i = V_i + \varepsilon_i \tag{3.1}$$

The observed component of utility can simply be represented by a linear expression where each variable affecting utility is multiplied by a weight (known as a parameter or coefficient) based on that attribute's marginal effect (Hensher, Rose, and Greene, 2005, p. 76).

$$V_i = \beta_{0i} + \beta_{1i} f(X_{1i}) + \beta_{2i} f(X_{2i}) + \beta_{3i} f(X_{3i}) + \ldots + \beta_{Ki} f(X_{Ki}) \tag{3.2}$$

where

V_i is utility observed by the analyst associated with the ith alternative

β_{1i} is the weight associated with the attribute X_1 and alternative i

β_{0i} is a parameter not associated with any of the observed and measured attributes, called the *alternative specific constant*, which represents on average the role of all the unobserved sources of utility.

The probability that they will choose a certain option is equal to the probability that the utility they would obtain from choosing that option is greater than (or equal to) the utility they would obtain if they choose any other option.

Each alternative can be denoted as U_j ; $j = 1, \ldots, J$ alternatives (Heshner, Rose, and Greene 2005, p. 82).

$$\text{Prob}_i = \text{Prob}(U_i \geq U_j) \; \forall j = 1, \ldots, J \; ; \; i \neq j \tag{3.3}$$

The decision of which product to buy is influenced by a number of factors, which include price, warning labels, and preferences such as taste, texture, and appearance. It would be difficult to measure the mentioned preferences, so product dummy variables are used as a proxy. Different demographic groups might also tend to act certain ways. The interaction between price and warning label may also affect a consumer's decision to buy the product.

3.2 Econometric Approach

3.2.1 Multinomial Logit Model

These data were analyzed in two different ways. The first is by using a multinomial logit (MNL) model estimation. This is a very widely used method to analyze choice experiment data that controls for demographics and other variables. The MNL choice model is derived by using equations (3.1), (3.2), and (3.3) and making certain assumptions (known as EV1 and IID conditions) about the unobserved component of utility (ε_i). The MNL model states that "the probability of an individual choosing alternative *i* out of the set of *J* alternatives is equal to the ratio of the (exponential of the) observed utility index for alternative *i* to the sum of the exponentials of the observed utility indices for all *J* alternatives, including the *i*th alternative" (Hensher, Rose, and Greene, 2005, p. 86).

$$\text{Prob}_i = \frac{\exp V_i}{\sum_{j=1}^{J} \exp V_j} \; ; \quad j = 1, \ldots, i, \ldots, J \quad i \neq j \tag{3.4}$$

3.2.2 Latent Class Model

The second econometric approach taken was using a latent class model. With all the demographics interacted with price and warning label in the MNL model it is hard to tease out the actual effect of price and each warning label, since the interpretation is complicated and must take all the interactions into account. The latent class model allows us to separate the people into different classes, which might differ in their responses to price and the warning labels. It might be more likely that a certain demographic of people might be in one class than another. This allows for interpretation of how each unique class is responding to the price and warning label easier than with the MNL model estimation because all the price and warning label variables being interacted with several demographic variables do not have to be dealt with. Latent class models incorporate one or more discreet unobserved variables and sort people into groups based on similar behaviour or preferences (Greene, 2007, p. E17-4).

$$g(\beta_i, x_{it}, \varepsilon_{it}) = E_{classes}[g(\beta_{class}' x_{it}, \varepsilon_{it}) | class] \quad (3.5)$$

where

i = 1,…,N denotes the ith group or individual.
t = 1,…,T_i denotes the tth period.
g = the density of the observed random variable conditioned on the arguments.
β_i = the parameter vector for the ith individual.
x_{it} = is used to denote an observed vector of independent variables.
ε_{it} = the stochastic component of the model.

Latent class models can be applied to different types of econometric models. In this case, it is applied to the MNL model. The number of classes can be chosen by the analyst based on which model estimation fits the data best.

3.3 Survey Instrument

3.3.1 Survey Design

A complete paper version of the survey can be found in Appendix A. The survey instrument consists of several multiple choice questions, list-style questions, choice experiment questions, and open ended questions. First, general questions about snack food purchasing behaviour are asked. These are followed by a set of eight choice experiment questions in the "Purchase Simulation" section. Next is the Multidimentional Health Locus of Control (MHLC) scale (Wallston, Wallston, & DeVellis, 1978). This consists of 18 questions that can be scored to give three scores which represent to what extent the person feels his health is controlled by his own actions, by chance, and by the influence of others. Following this, questions about exercise and label-reading habits are asked. The survey ends with questions about demographics, including height and weight in order to calculate body mass index (BMI).

There are eight different versions of the survey, which differ only in the choice experiment section. The differences between the versions are outlined in Table 3-1. With this design, every price combination between healthy and less healthy product is observed using each type of label as well as no label. Also, ordering effects can be observed if necessary.

Table 3-1 Choice experiment survey design: arrangement of prices and warning labels.

	Version 1		Version 2		Version 3		Version 4		Version 5		Version 6		Version 7		Version 8	
	H	**L**	**H**	**L**	**H**	**L**	**H**	**L**	**H**	**L**	**H**	**L**	**H**	**L**	**H**	**L**
Q1	$1.00	$2.00	$1.00	$1.00	$2.00	$1.00	$1.50	$1.00	$1.00	$2.00	$1.00	$1.00	$2.00	$1.00	$1.50	$1.00
Q2	$1.00	$0.50	$1.50	$2.00	$1.00	$1.50	$0.50	$0.50	$1.00	$0.50	$1.50	$2.00	$1.00	$1.50	$0.50	$0.50
Q3	$2.00	$2.00	$2.00	$0.50	$1.50	$1.50	$0.50	$1.00	$2.00	$2.00	$2.00	$0.50	$1.50	$1.50	$0.50	$1.00
Q4	$1.50	$0.50	$0.50	$1.50	$0.50	$2.00	$2.00	$1.50	$1.50	$0.50	$0.50	$1.50	$0.50	$2.00	$2.00	$1.50
Q5	$1.00	$1.00	$1.00	$2.00	$1.50	$1.00	$2.00	$1.00	$1.00	$1.00	$1.00	$2.00	$1.50	$1.00	$2.00	$1.00
Q6	$1.50	$2.00	$1.00	$0.50	$0.50	$0.50	$1.00	$1.50	$1.50	$2.00	$1.00	$0.50	$0.50	$0.50	$1.00	$1.50
Q7	$2.00	$0.50	$2.00	$2.00	$0.50	$1.00	$1.50	$1.50	$2.00	$0.50	$2.00	$2.00	$0.50	$1.00	$1.50	$1.50
Q8	$0.50	$1.50	$1.50	$0.50	$2.00	$1.50	$0.50	$2.00	$0.50	$1.50	$1.50	$0.50	$2.00	$1.50	$0.50	$2.00

Numbers are prices.

H = healthier product, **L** = less healthy product, **Q** = question

Diagonal pattern shading denotes the presence of warning label 1 (red light warning label).

Solid shading denotes the presence of warning label 2 (cigarette package style warning label).

3.3.2 Mod_Survey

Mod_survey, Version 3.2.4 was used to create electronic versions of the survey. It uses XML-based tag notation. Mod_survey is free software that runs on a Linux platform (Palmius, 2008). The eight versions of the survey were coded into mod_survey. A randomization code was entered on the opening page of the survey, so when the participant clicks on the link to continue they proceed to a random version of the survey. When a participant completes the survey, their responses are sent to database and stored so that it can be retrieved later. The complete code for a version of the survey can be found in Appendix B and sample screenshots from the actual survey can be found in Appendix C.

3.4 Data Collection

3.4.1 Focus Groups and Pretests

Two focus groups were conducted, in which participants were asked what factors they consider when buying snack foods. In order to recruit participants for the focus groups, posters were posted around the university campus advertising the focus group with a $20 supermarket gift card as the incentive. Participants filled out a sample survey to see how they responded to the choice experiment questions and were asked about their reaction to the warning labels. The pretests were held on September 18 and October 18, 2007. The survey was revised according to information gathered at the pretests.

Originally, three different kinds of warning labels were being tested. After several discussions about these warning labels, it was decided that one of these warning label designs should not be investigated. This was a warning that

was a subscript at the bottom of the nutrition facts label. More often than not, it went unnoticed; however, when pointed out, most people said this warning label would probably affect their next purchases. Since this experiment is about immediate purchasing behaviour, it was decided that this warning label was not appropriate for this project. Most people were supportive of the other two warning labels and said that they might try to avoid products that had these warning labels and agreed that this could be an effective way to discourage consumption of these foods. Some people said that they already knew that these products were less healthy and that warning labels would not really affect their consumption, since when they are buying junk food, they know that it is not good for them already. The two warning labels that were chosen to be tested are shown in Figure 3-1. In the actual survey, the circle in the first warning label is red like a stoplight. This label is similar to some labels that are being used in the United Kingdom (Food Standards Agency, 2009). The word "WARNING" in the second warning label is displayed in red letters in the actual survey. This warning label is similar to the warning labels on cigarette packages. These warning labels are completely made up. They are fictional and do not actually have anything to do with Health Canada; this is clearly stated on the last page of the survey.

Fat
This product is high in fat. It has been taxed due to its less healthy nutritional content.
Health Canada
WARNING
Excessive consumption of this product may lead to obesity and associated health problems.
This product has been taxed due to its less healthy nutritional content.
Health Canada

Figure 3-1 Made-up warning labels that are tested in the survey. (a) Left, red light style warning label. (b) Right, cigarette package style warning label.

In order to validate the survey instrument, three on-campus pretests were conducted – on January 28, February 7, and March 6, 2008. These were carried out in undergraduate classes where the students had the option to not participate. Classes ranged in size form 20 to 80. The information collected in these pretests was used to figure out which price levels should be used and to give us some insight on how students were responding to the warning labels.

An in-store pretest was conducted on June 17, 2008. A full survey with 60 respondents was conducted at a Save On Foods in Edmonton. The surveys were coded into mod_survey on a main laptop and five smaller "clamshell" computers (described below) were linked to its network. The participants sat down at one of the five clamshells and answered the questions on the Internet Explorer. The purpose of this pretest was to make sure all the equipment was working properly and to be able to gather some data for a preliminary analysis to make sure everything was working okay. This pretest provided some interesting preliminary results. One of these results is that BMI was affecting price and warning label

sensitivity. Based on this pretest, a final adjustment to the price levels were made before beginning the final data collection.

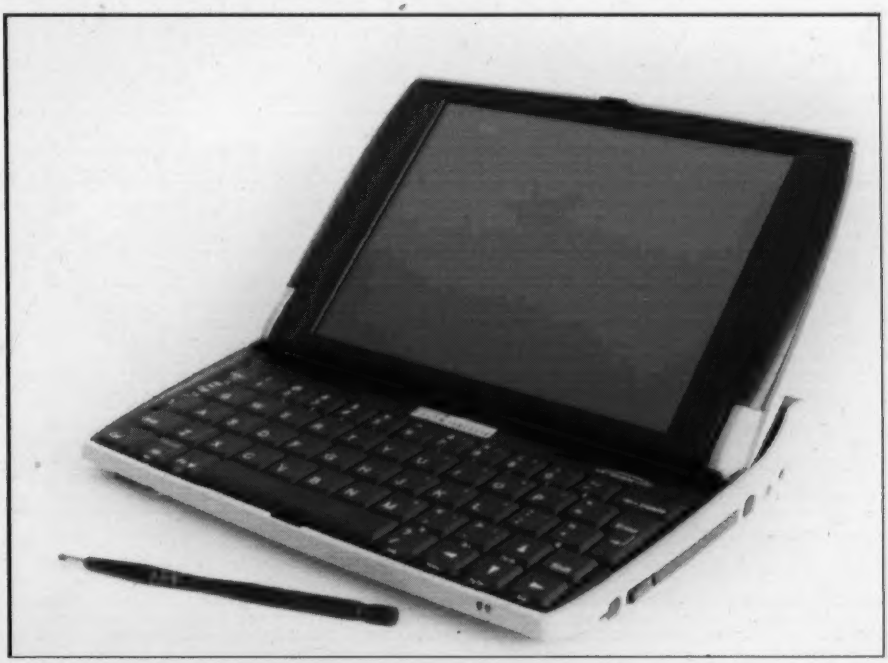

Figure 3-2 Clamshell computer.

Clamshell computers are small, touch-screen computers. A stylus is used to touch the screen to navigate. Using several of these is a convenient way to collect data because they are light and compact, making them very portable. Also, they can be used to fill out surveys using the mod_survey program so data do not have to be entered manually. The touch-screen nature of these computers makes them easy to use for most people. The clamshells used in this study were purchased with a grant received by Vic Adamowicz from the Canada Foundation for Innovation.

3.4.2 Final Data Collection

For the actual data collection, surveys were conducted at eight supermarkets across Alberta, Canada. The clamshells were brought into the supermarkets and set up on a table. A large banner that read "University of Alberta Snack Food Survey" was displayed along with a small poster advertising a $10 gift card for filling out a 10-20 minute survey. This data collection method was repeated in eight different supermarkets in July and August, 2008.

Detailed descriptions of each location can be found in Table 3-2. The author and a research assistant were present at all sites, one recruiting while the other helped participants with the survey. The stores selected were supermarkets that are targeted to the general public (i.e. not high end, organic, or ethnic supermarkets). Permission to conduct the study in each store was obtained by speaking to the store manager over the phone. Data collection lasted 6 hours in each location from 11:00 am to 5:00 pm or until 60 surveys were filled out – whichever came first. These surveys were conducted on weekdays.

Table 3-2 Data collection locations.

Location	Supermarket	Population of City/Town	Number of participants
St. Albert	Save On Foods	58 501[a]	50
Lacombe	Co-Op	11 562[b]	52
Brooks	IGA	13 581[c]	50
Medicine Hat	Co-Op	60 426[d]	50
Lethbridge	IGA	83 960[e]	58
Edmonton (Kingsway)	Save On Foods	752 412[f]	60
Edmonton (Namao)	Save On Foods	752 412[f]	50
Spruce Grove	IGA	19 496[g]	41

a. 2008 municipal census. Source: http://www.stalberta.ca/
b. 2007 municipal census. Source: http://www.lacombe.ca/
c. Source: http://www.brooks.ca
d. Source: http://www.medicinehat.ca
e. 2008 municipal census. Source: http://www.lethbridge.ca/
f. 2008 municipal census. Source: http://www.edmonton.ca/
g. 2006. Source: http://www.sprucegrove.org/

Chapter 4: Analysis and Results

4.1 Descriptive Results

This survey was targeted towards people who buy groceries. Since data were collected only during daytime hours on weekdays, the sample consisted of people who were most likely to be at a grocery store at that time. There were 364 people surveyed. The descriptive statistics for the final set of data were calculated using SPSS 14.0 (SPSS 14.0, 2005). The results are in Table 4-1.

Table 4-1 Selected Descriptive Statistics

	Mean	Min	Max	Std. Dev
FEMALE	.79	0	1	.408
AGE	48.028	18	81	14.046
HOUSE	2.78	1	7	1.288
CHILDREN	.71	0	5	1.049
SCHOOL	13.882	0	19.0	2.6593
INCOME	62608.069	5000.00	105000.00	31820.683
BMI	26.451	15.96	47.19	4.899

78 percent of the sample is female. The ***HOUSE*** variable is how many people live in the participant's household and ***CHILDREN*** is how many people under the age of 18 years live in the household. The ***SCHOOL*** variable is approximately how many years of school the participant has taken starting from Grade 1. If the respondent indicated that they have completed grad school, they were assigned 19 years of school as an estimate. ***INCOME*** is reported as annual household income. It was split into categories and asked in a multiple choice question. The midpoint of their corresponding category was used in the analysis as their income, unless they chose the highest income category ($100 000 or more). In this case, an estimate of $105 000 was used as their income. ***BMI*** was

calculated based on self-reported height and weight, using the formula weight(kg)/height^2(m^2). For a complete list of descriptive statistics and correlations, see the Appendix D.

A quick summary of the choice experiment results, not taking any attributes or demographic variables into account, can be found in Table 4-2. The values reported in the right column are market shares (the market is considered to be all products chosen and the "none" option). For example, a value of 0.05 for Cheetos means that 5 percent of the choices made were to buy Cheetos. Choosing to buy neither product is considered a choice in the market. The healthier products are chosen much more than the less healthy products. The "none" option is chosen about 22 percent of the time.

Table 4-2 Summary of products chosen.

Product		**Number of times chosen**	**Market share from all data**
Less healthy	Cheetos	151	0.051854
	Lays	225	0.077266
	Doritos	192	0.065934
	Dutch Crunch	168	0.057692
Healthier	Rold Gold	341	0.117102
	Baked Lays	419	0.143887
	Sunchips	429	0.147321
	Baked Doritos	349	0.119849
	None	638	0.219093
	Total	2912	1

Before getting into any econometric models, it is possible to do a quick analysis of the effect of each warning label by taking a look at the data for the less healthy products. For each label scenario, i.e. no warning label, the red light style warning label, and the cigarette package style warning label, the proportion that

each product is chosen can be calculated by dividing the number of times it is chosen by the number of times it is an option. Table 4-3 reports these proportions. The significance level of each warning label for each product is reported in parentheses. These are calculated by estimating a logit regression for each product with a dummy variable for choosing that product as the dependant variable and with a dummy variable for each warning label and a constant as the right hand side variables. The significance of each warning label dummy variable is reported as the significance of its corresponding product and warning label in Table 4-3, so they represent how significantly different the proportion chosen with the warning label is different from the proportion chosen without. The results show that smaller proportions of each product were chosen when they displayed a red light warning label than when they were unlabelled. The cigarette package style warning label has a surprising effect – opposite to what may be expected. For all products except for Doritos, higher proportions were chosen when they displayed the cigarette package style warning label than when they were unlabeled. From this preliminary analysis, it seems that the red light style warning labels are effective at decreasing consumption, but people are more likely to buy a product if it has the cigarette style warning label. The different wording of the warning labels might be the reason for this difference. The cigarette package style warning label says "excessive" consumption leads to obesity and problems, so people might justify buying a moderate amount of these products. The red light style warning label highlights the high fat content of the product. People might respond more to this information than to the warnings about

diseases on the cigarette style warning labels. The effects of these warning labels will be further explored with econometric models and simulations later in this chapter.

Table 4-3 Proportion of each less healthy product chosen with and without warning labels (Significance in parentheses).

Product	No warning label	Warning label 1 (red light)	Warning label 2 (cigarette package)
Cheetos	0.1709	0.1523 (0..605)	0.2910 (0.006)
Lays	0.3333	0.2400 (0.030)	0.3731 (0.402)
Doritos	0.3688	0.1711 (0.000)	0.3068 (0.189)
Dutch Crunch	0.2284	0.1921 (0.356)	0.2765 (0.271)

4.2 MNL Model Estimation Results

All MNL models were estimated using LIMDEP (Greene, 2008). Results from a simple model are shown in Table 4-4. The left hand side is a dummy variable for if the product was chosen. The explanatory variables are price, dummy variables for the presence of each type of warning label, an interaction term between price and each warning label, and dummy variables for each product except for Baked Doritos, which is the reference group. A base model (alternative specific constants only) is estimated in order to calculate model significance. The base model has a log likelihood function of -3107.153. The overall model significance can be tested by comparing the estimated model's log likelihood function with the log likelihood of the base model using (4.1) (Hensher, Rose, and Greene 2005, p. 330).

$$-2(LL_{\text{base model}} - LL_{\text{estimated model}})$$

$$\sim \chi^2_{(\text{number of new parameters estimated in the estimated model})} \quad (4.1)$$

Based on the -2LL test, the null hypothesis that the specified model is not better than the comparison model is rejected; the model is significant at the 5% level. A *pseudo-R^2* can be calculated using the following formula (Hensher, Rose, and Green 2005, p. 337):

$$R^2 = 1 - LL_{\text{Estimated model}}/LL_{\text{Base model}} \quad (4.2)$$

In this case, the *pseudo-R^2* = 0.0649..

Table 4-4 Simple MNL model estimation results.

Variable	Coefficient	Standard Error	P[|Z|>z]
PRICE	-.2062	.0834	.0134
WARNING1	-.8116	.2394	.0007
WARNING2	.0925	.2100	.6597
PW1	.2433	.1625	.1343
PW2	.0763	.1415	.5898
CHEETOS	-.8000	.1469	.0000
LAYS	-.2113	.1423	.1375
DORITOS	-.3646	.1301	.0051
DUTCH	-.6784	.1462	.0000
ROLD	-.1756	.1246	.1588
BLAYS	.2113	.1278	.0622
SUNCHIPS	.4148	.1137	.0003
ASCC	-1.031	.1690	.0000
Log likelihood function		-2905.493	

Dependant variable: ***CHOICE***

The coefficient on price is negative and significant, as expected. Also as expected, the coefficient on the red light style warning label is negative and significant. The cigarette package style warning label does not show a significant effect. There appears to be no significant coefficients on the interaction terms

between price and each warning label. People were least likely to choose Cheetos and Dutch Crunch. Sunchips and Baked Lays were the most preferred.

The simple model does not control for demographic and health variables. In order to include these variables in the model estimation, they are interacted with price or one of the warning label dummy variables. For each demographic or health variable, three interaction terms were created: the interaction with price, the dummy variable for the first warning label, and the dummy variable for the second warning label. A model including every demographic and health variable interaction was run and all variables with insignificant coefficients were left out of the model estimation. The final result is shown in Table 4-6 and the variable descriptions are found in Table 4-5. The -2LL test on this model shows that this model does have overall significance. Using (4.2), the *pseudo-*R^2 of this model is 0.1763. The *pseudo-*R^2 is directly related to the R^2 of a linear regression model (cited by Hensher, Rose, and Greene 2005, p. 338). In this case, the *pseudo-*R^2 of 0.1763 can be mapped to an R^2 of approximately 0.45. This value is estimated just by observing the graph on page 228 of Hensher, Rose, and Greene (2005).

Table 4-5 Variable descriptions.

Variable	
CHOICE	= 1 if product is chosen, 0 otherwise
PRICE	price of product ($)
WARNING1	= 1 if red light style warning label is present, 0 otherwise
WARNING2	= 1 if cigarette package style warning label is present, 0 otherwise
PW1	price and warning1 interaction term
PW2	price and warning2 interaction term
CHEETOS	= 1 if product is Cheetos, 0 otherwise
LAYS	= 1 if product is Lays, 0 otherwise
DORITOS	= 1 if product is Doritos, 0 otherwise
DUTCH	= 1 if product is Dutch Crunch, 0 otherwise
ROLD	= 1 if product is Rold Gold pretzels, 0 otherwise
BLAYS	= 1 if product is Baked Lays, 0 otherwise
SUNCHIPS	= 1 if product is Sunchips, 0 otherwise
BMI*PRICE	BMI and price interaction term
INCOME*PRICE	income and price interaction term
AGE*PRICE	age and price interaction term
CHANCE*W1	chance score (MHLC scale) and warning1 interaction term
EDU*W1	education (years) and warning1 interaction term
EDU*W2	education (years) and warning2 interaction term
FEMALE*PRICE	female (=1 if female, 0 otherwise) and price interaction term
LABELR*W1	label reader (=1 if read label always or more often than not, 0 otherwise) and warning1 interaction term
LABELR*W2	label reader (=1 if read label always or more often than not, 0 otherwise) and warning2 interaction term
ASCC	alternative specific constant

Table 4-6 MNL model estimation results.

Variable	Coefficient	Standard Error	P[|Z|>z]
PRICE	0.605176	0.233578	0.0096
WARNING1	0.383624	0.561189	0.4942
WARNING2	1.951363	0.4532	0.0000
PW1	0.268902	0.178324	0.1316
PW2	0.047553	0.152211	0.7547
CHEETOS	-0.90823	0.157797	0.000
LAYS	-0.26364	0.152659	0.0842
DORITOS	-0.37948	0.138995	0.0063
DUTCH	-0.71819	0.155753	0.000
ROLD	-0.1712	0.132768	0.1972
BLAYS	0.228036	0.135865	0.0933
SUNCHIPS	0.419365	0.121562	0.0006
BMI*PRICE	0.019258	0.006591	0.0035
INCOME*PRICE	-0.02886	0.010012	0.0039
AGE*PRICE	-0.01999	0.002358	0.000
CHANCE*W1	0.031632	0.013662	0.0206
EDU*W1	-0.08222	0.02689	0.0022
EDU*W2	-0.09328	0.028239	0.001
FEMALE*PRICE	-0.23536	0.080815	0.0036
LABELR*W1	-0.67431	0.182857	0.0002
LABELR*W2	-0.73471	0.158905	0.000
ASCC	-1.04886	0.180481	0.000
Log likelihood function -2559.329			

Dependant variable: ***CHOICE***

In this expanded model ***PRICE***, ***WARNING1***, and ***PW2*** turn out to have insignificant coefficients. However, since price and warning labels are interacted with demographics and health questions in the model it is hard to interpret their effect. This is because their total effect includes any interaction terms that they are included in. The MNL model estimation reveals important interactions between various demographic or health variables and price or warning labels.

4.2.1 Body Mass Index and Price

As shown in the MNL model estimation, the interaction term between BMI and price, ***BMI*PRICE***, is positive and significant. This predicts that people with higher BMIs are less sensitive to price. They are more likely to

choose the higher priced items. There was no significant interaction between BMI and warning labels. This could pose a potential problem, since those with high BMIs would be the target population for a warning label intervention with the goal of discouraging unhealthy eating habits. According to this model, those with lower BMIs will be more likely to avoid higher priced items, so if a tax on junk food was implemented it would more strongly affect those who are less likely to actually need to decrease their junk food consumption to maintain their weight and health.

4.2.2 Household Income and Price

The coefficient of ***INCOME*PRICE*** is negative, so the households with higher incomes are more sensitive to price. This result is counterintuitive since it is expected that those with lower income would have less money so they would be more careful with the money they do have, and therefore more sensitive than price. However, the data shows that those with lower income households are less sensitive to price and more likely to buy the higher priced snacks. It is not possible from the analysis to explain why this is the case, but a possible explanation is that lower income households are more likely to buy a cheap snack food product even if its price is a bit more expensive than usual while higher income households might not see that snack as necessary since they can substitute it with different snacks that are at a much higher price level, such as cheese and specialty crackers. Studies have reported that more calorie dense foods tend to be cheaper than foods with lower caloric density (Cash and Lacanilao, 2007; Drewnowski and Specter, 2004). Lower income households may be more likely

to buy cheap snacks because they do not cost much and they are high in calories; they can be considered an inferior good. This result suggests that the tax would be regressive, since the higher income households will respond more to price interventions by decreasing how much snack foods they buy. Lower income households would not respond as much to the price increase and would end up paying more of the tax.

4.2.3 Age and Price

Since the coefficient on ***AGE*PRICE*** is positive, the model is predicting that older people are more sensitive to price. This could be because older people are more likely to be careful with their money while younger people might be more likely to buy what they want despite a small price difference.

4.2.4 MHLC Scale

The MHLC scale was used in order to measure the extent that each participant believes his or her health is controlled by their own choices and actions. Attitudes and beliefs as well as feelings of self-control are important psychological influences on food choice (Draper, 2005). Those who score high in the "internal" category believe that they are in control of their health, so they are expected to react more to warning labels. Those who score high in the "chance" or "powerful others" believe that their health is determined by chance or by the actions of others (family, friends, health care professionals), so they are expected to react less to warning labels.

To make sure that the scale was working for the sample, a test of internal validity was run using SPSS (SPSS 14.0, 2005). Cronbach's alpha values for

internal, chance, and powerful others were .825, .759, and .752 respectively. These are favorable values that do not show any problems with the internal validity of the scales for the sample.

Surprisingly, the variables for the internal and powerful others categories are not significant in this model estimation. As expected, ***CHANCE*W1*** is positive. Those who have a higher chance score on the MHLC scale are more likely to choose products that display the red light style warning label. They may be more likely to believe that their level of health will be determined independent of whether or not they eat something unhealthy, since they believe so much of their health is determined by chance.

4.2.5 Education and Warning Labels

Since the interaction terms between education and each warning label (***EDU*W1*** and ***EDU*W2***) are both negative, the MNL model estimation reports that the people with higher education were more likely to avoid products displaying one of the warning labels. According to Draper (2005), psychological influences, including knowledge, can be one of the main contributors to food choice. Knowledge affects attitude, which affects behaviour. In this case, those with higher educations have more knowledge about health, so their attitudes may be generally more accepting of a healthy lifestyle. Therefore, a warning label pointing out that a food is less healthy may discourage their decision to buy it.

4.2.6 Gender and Price

The negative coefficient on ***FEMALE*PRICE*** indicates that females are more sensitive to price and so are more likely to choose cheaper products and avoid the more expensive products.

4.2.7 Label Readers and Warning Labels

As expected, there are negative coefficients for the interactions between the label reader dummy variable and each warning label dummy variable. Those who read Nutrition Facts labels on their products "more often than not" or "almost always" (as worded in the survey) are more likely to avoid products with warning labels than those who read Nutrition Facts labels "rarely" or "never". This is likely because people who read Nutrition Facts labels regularly are more concerned with their health, so they will be affected by the message on the warning label. Also, there is a better chance of someone actually noticing a warning label if they usually take the time to look for and read the Nutrition Facts label.

4.2.8 Alternative Specific Constant

The alternative specific constant (***ASCC***) represents the utility of choosing the "none" option. The higher this number is, the more likely the "none" option is chosen. The "none" option is predicted to be chosen when the utility of choosing either option is less than alternative specific constant.

4.2.9 Urban vs. Rural

A dummy variable, ***URBAN***, was created by assigning a 1 to surveys conducted in Edmonton and surrounding areas and a 0 otherwise. Although the dummy variable turned out significant, including it in the regression caused several of the other demographic variables to lose their significance. A logit regression predicting ***URBAN*** as a function of the other demographic variables suggests that including ***URBAN*** in the MNL regression is causing multicollinearity. The logit regression shows that ***BMI***, ***INCOME***,, ***SCHOOL***, ***CHANCE***, and ***LABELR*** all significantly explain ***URBAN*** (Table 4-7). For this reason, ***URBAN*** is left out of the MNL model estimation. It is interesting that those who live in and around Edmonton read labels so much more than those who live in the smaller cities and towns. The reasons as to why those in the bigger city read labels more often can not be directly observed from this analysis. A possible explanation is that there is lots of media being distributed all over the urban areas in the form of free newspapers and magazines. Nutrition is becoming a hot topic in the media and those who live in big cities may be more likely to be exposed to the media, so they may be more conscious of health and more likely to read nutrition labels on their food.

Table 4-7 Logit regression.

	Coefficient	P[|Z|>z]
BMI	.024	.000
INCOME	.113	.000
SCHOOL	.030	.001
FEMALE	.009	.879
AGE	-.003	.120
CHANCE	.019	.000
LABELR	.447	.000
Constant	-2.366	.000
-2LL	10 608.170	
Cox & Snell R Square	0.045	
Nagelkerke R Square	0.060	

Dependant variable: ***URBAN***

4.2.10 Sequencing

The experimental design was set up in such a way that made it possible to determine whether people responded differently to warning labels if they were presented in the first half of the survey or the second half of the survey. This could be used to detect any learning that might occur during the survey process. For example, by the last half of the survey people may know which products they like and stop paying as much attention to price or warning labels.

In order to test for sequencing, dummy variables for the last five questions were created. They were then interacted with price and each warning label. None of these interaction terms turned out significant at the 5 percent level of significance, so the data do not show evidence of significant sequencing.

4.2.11 Grams of Fat

Although the nutrition facts panel is provided, it is not included in the main analysis. The product dummy variables are used to take all the differences between the products into account, including their nutritional facts. However, it may be that people look at how many grams of fat there are per serving and take

that into account when making a decision on what product to buy. In order to test this, the product dummy variables are replaced with a variable for how many grams of fat are in a product is used in the model estimation.

The coefficient on the variable for grams of fat did not turn out significant in any of the model specifications. Therefore, the hypothesis that people look base their decisions on how many grams of fat there are per serving is rejected for this sample. This suggests that people are actually looking at brands and that their choices are not related to how much fat is in a product. Their decisions might be based on brand loyalty or on their taste preferences.

4.2.12 Price Premium of Warning Label

Willingness to pay can be calculated if the variable of interest and the price variable are both significant (Hensher, Rose, and Greene, 2005, p. 359). In order to calculate the price premium for the red light style warning label, the simple MNL model estimation or the MNL model estimation shown in Table 4-8 (used for the hypothetical market in the next section) can be used. Following along same lines as Hensher, Rose, and Greene (2005), the price premium for the cigarette package warning label can be calculated for this data by taking the negative ***WARNING2*** divided by the coefficient of ***PRICE*** in the appropriate MNL model estimations (where both are significant).

For the simple MNL estimation and for the MNL model estimation shown in Table 4-8, the price premium for the red light style warning label is calculated as -$3.94 and -$4.36 respectively. This is a negative price premium, so a product is worth about $4 more to a person if it has no warning label when compared to a

product that has one. This seems like a big value but since people had small price sensitivity, a big price premium is needed in order to actually make a noticeable difference in behaviour. Adding a warning label to a product has the same effect on consumer behaviour as raising its price by about $4. This is a huge price increase for such a cheap product, so this shows how greatly effective the red light style warning label is at reducing consumption when compared to raising price.

4.2.13 Price thresholds

There is a possibility that price thresholds exist. People might only respond to price if it is within a certain range or completely be deterred from buying a product at a certain price. If the effect of price on choice is not linear, it would not be accurately expressed with a single continuous variable. In order to test if price thresholds might exist, dummy variables for the price levels used in the choice experiment were used in the regressions instead of ***PRICE***. The dummy variables were not significant in any of the specifications tested, so price thresholds are not observed in this data.

4.3 Hypothetical market results

4.3.1 Setting up the Hypothetical Market

A hypothetical market of all eight products used in this study was set up on an Excel spreadsheet in order to simulate what would happen given different scenarios (Microsoft® OfficeExcel, 2003). By changing prices, marginal effects and elasticities for each product can be calculated. Also, simulations can be set up so that reactions to warning labels can be observed. Situations involving people with different BMIs or household incomes can be simulated and the difference in their product choice can be calculated.

For the purposes of the simulation, the MNL model shown earlier was simplified. Fewer interaction terms were used, so the effects of price and each warning label were not as complicated. The model used for the hypothetical market is shown in Table 4-8.

Table 4-8 MNL model estimation used for the hypothetical market.

Variable	Coefficient	Standard Error	P[|Z|>z]
PRICE	-0.32715	0.196097	0.0953
WARNING1	-1.42553	0.329569	0.0000
WARNING2	0.114695*	0.221183	0.6041
PW1	0.280674*	0.172416	0.1035
PW2	0.074054*	0.149058	0.6193
CHEETOS	-0.8671	0.155212	0.0000
LAYS	-0.25104	0.150172	0.0946
DORITOS	-0.38111	0.137139	0.0055
DUTCH	-0.72685	0.15397	0.0000
ROLD	-0.16474*	0.13096	0.2084
BLAYS	0.225294	0.133976	0.0926
SUNCHIPS	0.426291	0.119401	0.0004
BMI*PRICE	0.010223	0.006205	0.0995
CHANCE*W1	0.040864	0.012791	0.0014
INCOME*PRICE	-0.02488	0.009561	0.0093
ASC	-1.00363	0.177598	0.0000
Log likelihood function	-2652.075		

*These coefficients are not significant at the 10% level so in the hypothetical market zeros are used in their place.

The MNL model used for the hypothetical market included the same variables as the simple MNL model shown in Table 4-4, but the interaction terms between ***PRICE*** and ***BMI*** as well as ***INCOME*** were included. The interaction term between CHANCE and WARNING1 was also included. The MNL equation (3.4) is used to calculate the market share of each product. The setup of the spreadsheet can be found in the Appendix E.

Initially, the hypothetical market is set up like a vending machine where each product costs $1.25 and there are no labels and average BMI (26.451), income ($62 608.069) and chance score (15.937) are used in the simulation. With this set-up, the probability of choice values, i.e. market shares, of each product, are calculated as reported in the first column of numbers in Table 4-9. These are reported as decimals so, for example, a 5 percent market share would be reported

as 0.05, and the total of all probability values will be 1. Figure 4-1a (left) shows the difference between the initial market share and the new market share given the interventions simulated in the last three columns of Table 4-9.

Table 4-9 Probability of choice (market shares) of each product given different price and warning label scenarios.

Product		Initial market share (no labels, original price)	Warning labels on less healthy products	Increased price of less healthy products by $1	Increased price by $1 and warning labels on less healthy products
Less healthy	Cheetos	0.055089	0.030494	0.047353	0.025493
	Lays	0.102005	0.056463	0.08768	0.047204
	Doritos	0.089563	0.049576	0.076986	0.041447
	Dutch Crunch	0.063384	0.035085	0.054483	0.029332
Healthier	Rold Gold	0.131113	0.157417	0.139386	0.162765
	Baked Lays	0.164244	0.197195	0.174608	0.203895
	Sunchips	0.200808	0.241095	0.213479	0.249286
	Baked Doritos	0.131113	0.157417	0.139386	0.162765
	None	0.062681	0.075257	0.066637	0.077814
	Total	1	1	1	1

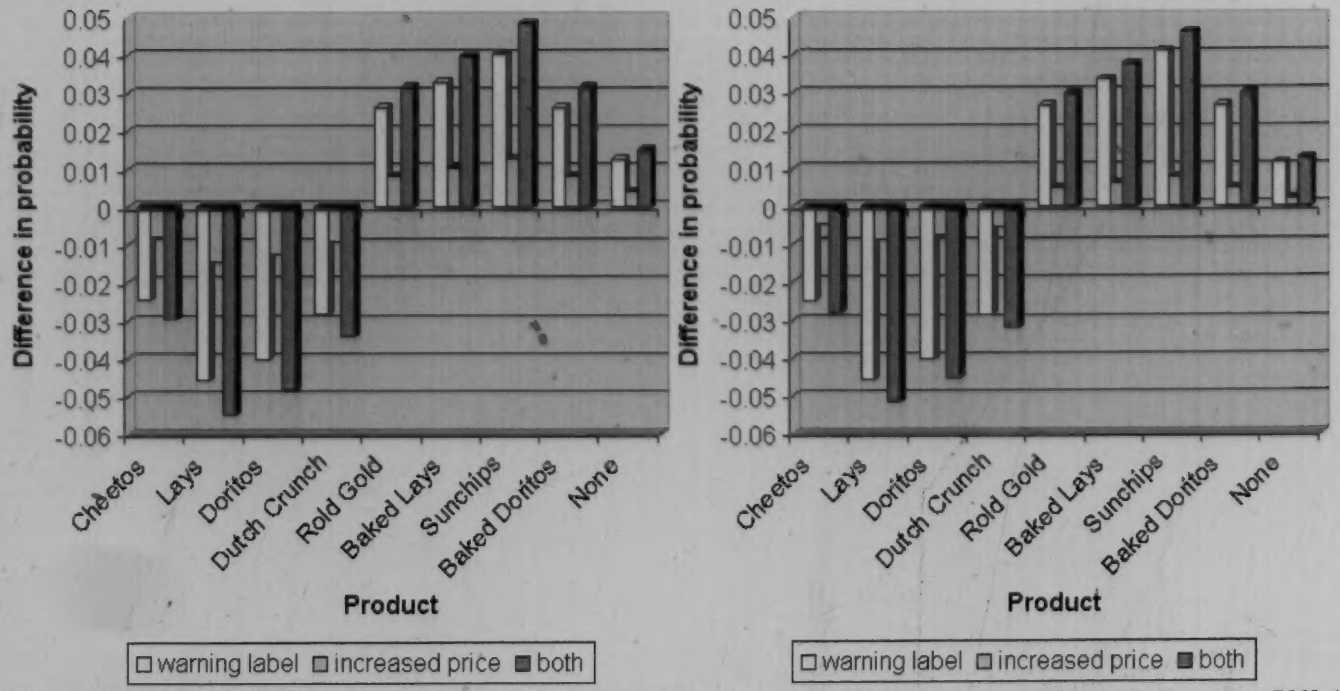

Figure 4-1 Difference in probability from initial market given different warning label and price scenarios. (a) Left, average BMI. (b) Right, BMI=35.

4.3.2 Effect of Warning Label on Choice

The effect of adding a warning label to the less healthy products is shown in Table 4-9. The red light style warning label is used for this simulation, since the cigarette style warning label's coefficient is not significant. The share of each less healthy product is lowered drastically (by about one half) while the share of each healthier product is increased. For example, the share of Lays decreases from 10.20 percent to 5.65 percent while the share of Baked Lays increases from 16.42 percent to 19.72 percent. The white bars in Figure 4-1a show the difference between the initial probabilities and the probabilities after a warning label is applied to the less healthy products.

4.3.3 Effect of Price on Choice

The effect of increasing the price of the less healthy products by $1 is also simulated. Increasing the price by $1 is quite a drastic increase in price, since the initial value is only $1.25, so raising it to $2.25 is an 80 percent increase in price. Even though this is a very large price change, the shares are not affected nearly as much as when the warning labels were applied. For example, the share of Lays goes from 10.20 percent to 8.77 percent while the share of Baked Lays goes from 16.42 percent to 17.46 percent. The lighter gray bars in Figure 4-1a show the difference between the market shares in the initial state and the market shares after a price intervention. These bars are much smaller than the white bars representing the change after the warning label intervention.

The combined effect of increasing price by $1 and adding a warning label to the less healthy products is also simulated and reported in Table 4-9.

Increasing price and adding a warning label at the same time discouraged consumption of the less healthy products the most and encouraged consumption of the healthier products the most. Although simultaneously increasing price and adding a warning label was more effective than either by itself, there does not seem to be a synergistic effect from doing them at the same time.

With the interventions, people are still choosing to buy snacks. The share of people choosing "none" is barely increased by the interventions. It should be noted that each coefficient used in the simulation is associated with its own confidence interval, so the small changes in market shares due to price might not be significant.

4.3.4 High BMI Simulation

To simulate how a person with a higher BMI would respond to warning labels and price changes, the same scenario as reported in Table 4-9 is repeated except instead of using the average BMI, a BMI of 35 is used. A BMI of 35 is considered obese. The results of this simulation are reported in Table 4-10. The changes from the initial state given the different price and warning label scenarios are shown in Figure 4.1b (right).

Table 4-10 Probability of choice (market shares) of each product for different price and warning label scenarios for an obese individual (BMI=35) .

Product		Initial market share (no labels, original price)	Warning labels on less healthy products	Increased price of less healthy products by $1	Increased price by $1 and warning labels on less healthy products
Less healthy	Cheetos	0.055419	0.030733	0.050792	0.027682
	Lays	0.102671	0.056906	0.094048	0.051256
	Doritos	0.090148	0.049965	0.082577	0.045005
	Dutch Crunch	0.063798	0.03536	0.05844	0.03185
Healthier	Rold Gold	0.131969	0.158653	0.136997	0.161947
	Baked Lays	0.165316	0.198743	0.171614	0.20287
	Sunchips	0.202119	0.242988	0.209819	0.248033
	Baked Doritos	0.131969	0.158653	0.136997	0.161947
	None	0.056561	0.067998	0.058716	0.06941
	Total	1	1	1	1

The simulation predicted that people who have a BMI of 35 would not be very sensitive to price at all. A huge increase in price from $1.25 to $2.25 only ever affected the probability of choosing something by less than 1 percent. Given that each of these is an estimate based on coefficients within a certain confidence interval, it is likely that none of these small changes are significantly different than zero. The warning label remained effective, decreasing the probabilities of choosing the less healthy options by almost one half and increasing the probability of choosing the healthier options by a few percent. When a warning label is present, increasing the price of the less healthy products by $1 further decreased their market shares by less than 1 percent, so it is likely that this additional decrease in market shares is not statistically significant.

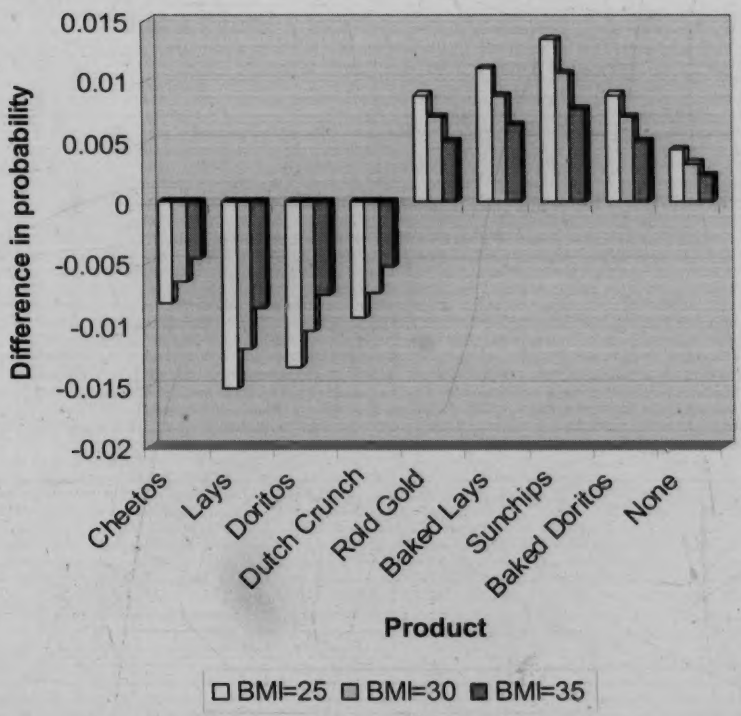

Figure 4-2 Difference in probability of choosing each product after an increase in price of less healthy products by $1 at different BMI levels.

Figure 4-2 shows how people are predicted to react to a price increase of less healthy products by $1 at three different BMI levels. Generally, people in this study did not respond very much to price. The effect of price becomes even smaller as BMI becomes larger. This result is very important for policy makers. This simulation predicts that a price increase of the less healthy products by $1 would affect the probabilities of choosing any product by less than 1 percent for a person with a BMI of 35. Since decreasing consumption of high calorie foods would benefit the high BMI people the most, increasing price does not seem like a good strategy, since it will not really affect consumption. However, a warning label saying that the less healthy product is taxed and why would be an effective

way for people of all BMI levels to decrease their consumption of these products. Given the current analysis, it is not possible to determine what compponents of the warning label are stigmatizing. It could be the information that the product is high in fat, the warning that the product has less healthy nutritional content, the information about the tax, or a combination of these.

4.3.5 Marginal Effects and Elasticities

The simulation framework is used to calculate marginal effects and elasticities. The model estimation described in Table 4-8 was used for these simulations and the average BMI, chance score, and income are used.

The marginal effect is the change in probability due to a 1 unit change in a variable of interest. In this case, the variable of interest is price. The marginal effect is calculated by observing the probabilities at a given price, increasing the price by $1, observing the new probabilities, and taking the difference. The price range in this study is from $0.5 to $2, so the mid point is $1.25. To center the price change on this mid point, each product starts at $0.75. For the simulation, there are no warning labels and the average BMI and income are used. The results of this simulation are in Table 4-11. The probabilities when price is increased by $1 are calculated by raising the price of the product of interest and leaving all other products at $0.75. A raise in price of $1 lowered the probability of buying that product by anywhere from about 1 percent to 3 percent. Sunchips and Baked lays were the most affected. This is a very small change in probabilities, since a $1 change in price is a very drastic change.

Table 4-11 Calculating marginal effects using the simulation framework.

Product	Initial probabilities (price=$.75)	Probability when price increased by $1	Direct marginal effect
Cheetos	0.05544	0.045307	-0.01013
Lays	0.102653	0.084664	-0.01799
Doritos	0.090133	0.074157	-0.01598
Dutch Crunch	0.063787	0.052213	-0.01157
Rold Gold	0.131946	0.10945	-0.0225
Baked Lays	0.165288	0.138011	-0.02728
Sunchips	0.202085	0.169972	-0.03211
Baked Doritos	0.131946	0.10945	-0.0225

An elasticity is the percent change in probability due to a one percent increase in the variable of interest. To calculate the direct price elasticity of each product, a simulation similar to the one used for marginal effects was set up, but the initial price of each product was $1.25. The price of a less healthy product was then raised by 1 percent to $1.2625, and then the percentage change in probability was calculated. This was repeated for each product.

The elasticities are reported in the last column of Table 4-12. These are calculated for the average BMI and income and without warning labels. The own price elasticity of each product ranges from -0.2437 to -0.2048. As expected, the elasticities are negative, since a higher price means a lower probability of getting chosen. Also, as expected, the absolute values of the elasticities are less than one. An elasticity less than one is considered to be inelastic, i.e. the price changes a lot but the demand changes very little. This is expected from most food products, since they are generally inexpensive, some people have strong taste preferences, and because people need food to live. These results agree with the simulations from Table 4-9, in which a large change in price did not affect the market shares

very much; therefore, the products are price inelastic. Taxing inelastic goods may be a good strategy to generate revenue, but it is not an efficient way to give disincentive to the consumption of that good.

Table 4-12 Calculating elasticities using the simulation framework.

Product	Initial probabilities (price=$1.25)	Probability when price increased by 1 percent	Elasticity (Percent change in probability)
Cheetos	0.055089	0.054951	-0.2505
Lays	0.102005	0.101762	-0.23822
Doritos	0.089563	0.089347	-0.24117
Dutch Crunch	0.063384	0.063226	-0.24927
Rold Gold	0.131113	0.13081	-0.2311
Baked Lays	0.164244	0.163879	-0.22223
Sunchips	0.200808	0.200382	-0.21214
Baked Doritos	0.131113	0.13081	-0.2311

4.4 Latent class model estimation results

A latent class model estimation based on MNL is used in order to get an interpretation for the price variable, the warning label variables, and the interactions between them while taking demographic and health variables into account. Models with 2, 3, and 4 classes were estimated using LIMDEP 9.0 (Greene, 2008). Comparing the standard measures of AIC, BIC, and HQIC did not show that any model estimations was clearly the best, and any differences were small. For example, the HQIC suggested that the model estimation with 3 classes was probably the best fit while the AIC suggested the model estimation with 4 classes was favourable. The model estimation with 3 classes was chosen as the final model because the several coefficients in the class probability

estimates show the most significance in this model estimation, and each class was unique in their product preferences, they way they responded to price, and the way they responded to warning labels. Their utility parameter estimates are in Table 4-13 and their class probability estimates are reported in Table 4-14.

Table 4-13 Latent class model utility parameter estimation results. Dependant variable: CHOICE

	Class					
	Class 1		Class 2		Class 3	
Variables	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
ASCC	-2.62528	0.50856**	-3.60972	0.30764**	0.482521	0.20975**
PRICE	-0.17227	0.24100	-0.28239	0.14133**	-0.37206	0.10351**
WARN1	-1.41022	0.51090**	-0.5491	0.38944	-0.36149	0.31556
WARN2	-0.01329	0.50399	0.011653	0.28490	0.100851	0.31977
PW1	1.08474	0.36324**	-0.47403	0.28427*	-0.11255	0.22694
PW2	0.461743	0.34936	-0.07524	0.19730	-0.23879	0.24864
CHEETOS	-0.49152	0.37056	-1.52673	0.21544**	-0.59308	0.21098**
LAYS	-0.36472	0.36712	-0.77524	0.19051**	0.696612	0.18588**
DORITOS	-0.03250	0.31593	-0.68981	0.15666**	-0.11206	0.20841
DUTCH CRUNCH	-0.54409	0.35524	-0.89348	0.19061**	-0.85849	0.23820**
ROLD GOLD	-1.18705	0.39334**	-0.48811	0.18658**	0.545719	0.15126**
BAKED LAYS	-0.31488	0.36254	0.123577	0.20089	0.796396	0.15644**
SUN CHIPS	-0.32753	0.30853	0.757509	0.18780**	0.86446	0.13712**
CLASS PROBA-BILITIES	.232		.391		.377	

Note: Significance levels of 0.05 and 0.1 are denoted by two and one asterisks (**, *), respectively.

Table 4-14 Latent class model class probability estimates.

Variables	Class 1		Class 2	
	Coeff.	**S.E.**	**Coeff.**	**S.E.**
Constant	1.79938	1.393805	0.808081	0.90779
FEMALE	-1.03004	0.432631**	-0.62244	0.366003*
BMI	0.059949	0.033491*	-0.00065	0.000615
EDUCATION	-0.223520	0.079727**	-0.019183	0.059511
Note: Significance levels of 0.05 and 0.1 are denoted by two and one asterisks (∗∗, ∗), respectively.				

A matrix predicting class membership probabilities for each participant was created. Each person's predicted class was noted. The participants were separated into three groups by which class they are most likely to be in. Mean and standard deviation statistics of each of these groups are show in Table 4-15. The statistics separated by predicted class reinforce the results of the class probability estimates and give further insight into the differences between the classes. Class 3 contains the most females while Class 1 has the least. Class 2 and 3 have an average BMI of about 26. Class 1 has a higher average BMI at 27.9.

Table 4-15 Mean statistics by predicted most likely class (standard deviation in parenthesis).

	Class 1 (n=78)	Class 2 (n=144)	Class 3 (n=142)
FEMALE	0.65 (0.479)	0.78 (0.412)	0.87 (0.342)
AGE	44.14 (14.171)	46.74 (13.617)	51.45 (13.775)
HOUSE	2.95 (1.485)	2.92 (1.276)	2.53 (1.156)
CHILDREN	0.95 (1.268)	0.78 (1.074)	.51 (.848)
EDUCATION	12.532 (3.128)	14.198 (2.228)	14.303 (2.568)
INCOME	56 756.76 (34 891.539)	61 888.89 (31 610.188)	66 449.28 (30 074.135)
LABELR	0.60 (0.493)	.77 (.422)	0.83 (0.376)
BMI	27.856 (6.277)	25.906 (4.586)	26.179 (4.143)

The three distinct classes have different taste preferences, react to price and warning labels in their own way, and are made up of different demographic groups.

4.4.1 Class 1 – "Warning Label Avoiders"

This class avoids Rold Gold; the coefficients on all other product dummy variables are not significant. Males are more likely to be in this class than the other two. Also, people with higher BMIs are more likely to be in this class, as well as those with lower educations. Members of this class very strongly avoid products displaying the red light style warning label. They are not sensitive to price on its own, which is expected since the MNL model estimates that males and people with higher BMIs are less sensitive to price than females or people with lower BMIs. However, the presence of a warning label appears to cause them to prefer higher priced products. This is counterintuitive since they are more

likely to choose higher priced products than lower priced products if a warning label is present. There must be some confounding variables that are not taken into account by this model estimation and it is causing this surprising result.

4.4.2 Class 2 – "Unhealthy Snack Avoiders"

This class consists of people who avoid choosing the less healthy options, despite price and whether or not a warning label is present. Compared to the reference group (Class 3), females are less likely to be in this class. These people are directly sensitive to price. Members of this class do not care about the warning label directly, but they associate some sort of stigma with it. The interaction term between price and the warning label (***PW1***) is negative and significant, so they are more sensitive to price if the stop light style warning label is present. For this class only, the fat tax itself has greater behavioural impact when there is a stigmatizing label present.

4.4.3 Class 3 – "Price Sensitive Class"

Class 3 is unique because they are the only class that strongly prefers Lays, and also the only class that prefers Rold Gold. They also prefer Baked Lays and Sunchips and they strongly avoid Dutch Crunch and Cheetos. These people can be considered to like the simple, classic snacks such as regular chips or pretzels. Group membership in this class is more likely if they are females. This group is sensitive to price; they are more likely to choose cheaper products, holding all the other right hand side variables in the model constant. Their elasticites compared to the average were simulated and are shown in Table 4-16. They are about twice as price sensitive as the average person in the sample. They

do not respond directly to the red light style warning label and there is no interaction between price and warning label, so the presence of the warning label does not affect their purchasing decision. They are the only class with a positive alternative specific constant; they are more likely to choose the "none" option than the other two classes.

Table 4-16 Elasticities of Class 3 compared to average elasticities.

Product	Average Elasticity	Elasticity of Class 3
Cheetos	-0.2505	-0.4456
Lays	-0.23822	-0.39717
Doritos	-0.24117	-0.43071
Dutch Crunch	-0.24927	-0.44989
Rold Gold	-0.2311	-0.40654
Baked Lays	-0.22223	-0.39015
Sunchips	-0.21214	-0.38495
Baked Doritos	-0.2311	-0.43071

Chapter 5: Conclusions

5.1 Summary of Results

Some people will respond to a tax on junk food differently than others. It is useful to policy makers to know which demographic groups a fat tax would actually affect. The MNL model estimation results show that a lower BMI is associated with higher price sensitivity, so a fat tax would be more effective at decreasing consumption of junk food for those that have a lower BMI. This is a worrisome finding, since this is not the demographic that should be targeted with the fat tax in order to be the most effective at decreasing the strain on the health care system. The people with lower BMIs will respond most to a price change, but they already have low risks of the diseases associated with obesity, so further decreasing their consumption of junk food might not make a significant difference to their risk. It is more important to try to get the people with higher BMIs to decrease their consumption of junk food because even a small decrease in weight can significantly decrease their risk of disease (Eckel and Krauss, 1998). On the other hand, it is not completely pointless to discourage those with healthy BMIs to avoid junk food because this can help prevent them from becoming overweight or obese in the future. The hypothetical market results show that even people with average BMIs do not respond very much to price alone, so a tax on junk food would not be an effective way to decrease consumption of those less healthy products.

Another issue is the interaction between income and price. People who live in households with higher income are more sensitive to price for this group of

products, so they would have more of a response to a tax. They would be more likely to decrease their purchases of the taxed junk food. The lower income people are less sensitive to price, so they are more likely to purchase the junk food that is taxed. In this way, the tax would be regressive since, more often than not, the lower income people would be the ones paying it. A regressive tax is not favorable.

The MNL model estimation provides limited little insight as to how people would respond to a warning label and the interaction it would have with price. It shows that more educated people and those who regularly read Nutrition Facts labels would avoid products displaying a warning label. A latent class model is estimated in order to obtain a better understanding of how a labeling campaign might be received. It is apparent that the red light style warning label was much more effective than the cigarette package style warning label. One of the three classes clearly avoid products displaying the warning label. The hypothetical market results show that the market shares of the less healthy products were decreased approximately in half with the warning label present.

This study fails to reject the hypothesis that fat tax would have a greater behavioural impact with stigmatizing labels present. Willingness-to-pay calculations using MNL estimations showed that the presence of the red light style warning label had an equivalent effect on product choice as a price increase of about $4. The simulations show that the presence of a stigmatizing warning label causes people to avoid choosing less healthy products while the tax alone has a very small impact on their behaviour. It seems like people are directly

avoiding the warning label. While this is the case for most people, the LCM shows that a group of people, Class 2 (see 4.4.2), respond more to a fat tax when a stigmatizing warning label is present. They are not directly avoiding the warning label, but they respond more to price if it is present.

Another important result from this study is that the type of warning label matters. The model estimations show that people avoided the red light style warning label but did not respond, or reacted in an unexpected way, to the cigarette package style warning label.

5.2 Discussion

5.2.1 Strengths

Using a survey for data collection allows researchers to ask specific demographic and health questions of interest. In-store data collection is a good way to find the target group – the grocery shoppers of the household. Also, setting up the survey on several clam shell computers allows for efficient data collection, since five people were able to fill out the survey at a time. The MNL model estimation is a great way to analyze which demographic groups are sensitive to price or warning labels. It also allowed incorporation of the "none" option into the model estimation as the alternative specific constant. The hypothetical market made it possible to simulate product choice probabilities given several different scenarios. The latent class model estimation was an interesting way to allow interpretation of the price and warning label variables, as well as the interaction between the two, for different classes within the sample

without being confounded by their interaction terms with demographic and health variables.

5.2.2 Weaknesses

There is always sample bias when conducting voluntary surveys, since only those who agree to take the survey will actually take it, and some groups of people might be more likely to agree to take a survey or to respond to the $10 gift card incentive. Since these surveys were conducted during daytime hours on weekdays, the people who are more likely to be shopping at these times make up much of the sample. This could result in an oversampling of certain demographic groups that may not be representative of the population of interest. Also, since the purchase simulation is hypothetical, people might not act realistically. Since no money is actually involved, some people might ignore price. This might affect the results by underestimating the effect that price has on consumers. Another issue is that they might choose the healthier products because they figure out that the survey is a health survey based on these warning labels, so they pay special attention to the unfamiliar warning labels being tested. This could result in an exaggerated response to the warning labels. In real life, a warning label might lose some of its effect after it becomes familiar.

The population of interest for this study consists of people who buy snack food. The study is conducted in grocery stores, which may not be the best place to get at this population because those who are shopping at grocery stores are often buying food to be prepared at home for future consumption. The people who are buying snacks are more likely to be at vending machines or convenience

stores. There is a potential disconnect between the supermarket setting and the vending machine scenario. The ideal person for this study is someone who buys snacks often, and this person is more likely to be found searching for snacks by a vending machine rather than a supermarket.

Another limitation of this study is that it is difficult to see if people are looking at various nutritional attributes. The product dummy variables mask any effects of individual attributes. Taste is an attribute that is not measured easily, but it strongly affects food purchasing decisions.

Wansink (2004) identifies several environmental factors that influence food consumption. These include lighting, temperature, odor, and noise. The stated choice exercise in this study ignores the influences that such factors may have.

5.2.3 Possible Extensions

Actual market experiments would be an interesting way to get non-hypothetical responses to prices and warning labels. A possible way to do this is to stock vending machines with the products and tamper with the prices and warning labels and observe sales. The downside of this is that it would be difficult to get any demographic information from the customers.

There are typically vending machines at schools and cafeterias where children, who often have some spending money, can make their own decisions and buy the food products they want. Since prevention of obesity is important, and obesity in youth is a growing problem, it would be valuable to conduct

similar studies targeted at children to see how they respond to price and which warning labels might be effective for them.

It might also be beneficial to conduct a nation-wide survey. People living in different provinces will likely respond to price changes and warning labels in different ways.

5.3 Policy Implications

Policies can be used to help decrease consumption of less healthy junk food, which should result in a healthier population and less strain on the health care system. The way people respond to price, warning labels, and the interaction between the two is significant to policy makers. This study gives insight as to what can be expected from a fat tax as well as what reaction can be expected from a warning label pointing out the fat tax.

A tax on less healthy food products would not be an effective way to decrease their consumption so it is not recommended for this purpose. A tax would be able to generate revenue, since consumption of these products is not really affected by price. The problem with using a fat tax to generate revenue is that it may be regressive. The lower income families who already spend much of their income on food might end up paying most of the tax.

A red light style warning label, which points out that the less healthy food is taxed and why, would be an effective way to discourage the consumption of these products. It is more important to tell people that the product is taxed than to actually tax it. An increase in price is not even necessary; a label stating that the

food is taxed because it is less healthy is enough to significantly discourage people from buying that product.

Perhaps the most effective thing to do would be to add a stigmatizing label to the targeted products and then add on a very small tax or even no tax at all. This way, the labels would decrease how much of these products are consumed while a regressive tax is avoided. This may be an effective way to decrease the financial strain on the health care system by encouraging healthier food choices without administering a tax that would be paid mostly by lower income households.

These policy recommendations differ from those who support a fat tax, such as Jacobson and Brownell (2000), who recommend taxing soft drinks, candy, chewing gum, or snack foods in order to raise revenue to fund health promotion programs. The problem with their recommendation is that these health promotion programs will be funded by taxes collected mostly from low income households, since this study predicts that a fat tax would be regressive. It may be more effective to promote health in a way that does not involve taxing food. Boizot-Szantaï and Etilé (2005) recognize that a fat tax would not influence health very much and recommend policy targeted at energy expenditures and nutritional knowledge instead.

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Appendix A: Example Paper Version of the Survey

Introduction

Thank you for agreeing to take part in this pretest.

The purpose of this study is to analyze consumer behaviour when purchasing snack food. This pretest serves to help us improve the questionnaire.

As you go through the survey, we ask that you answer each question.

Section 1: Usual Snack food purchases

1. What types of snack food products do you usually buy? **Please check all that apply**

   - ☐ Potato chips
   - ☐ Corn chips
   - ☐ Cheese puffs
   - ☐ Pretzels
   - ☐ Popcorn
   - ☐ Chocolate bars
   - ☐ Cookies/Crackers
   - ☐ Candy (jelly beans, lollipops, etc.)
   - ☐ Ice-cream
   - ☐ Others

     Please specify _____

2. How often do you buy snack food products (listed in Question 1) that you consume within an hour or purchase? **Please check one only**

   - ☐ 5 or more times per week
   - ☐ 2 - 4 times per week
   - ☐ 3 - 4 times per month
   - ☐ 1 - 2 times per month
   - ☐ Less than 1 time a month
   - ☐ Never

3. How often do you buy snack food products (listed in Questions 1) for later consumption? **Please check one only**

   - ☐ 5 or more times per week
   - ☐ 2 - 4 times per week
   - ☐ 3 - 4 times per month
   - ☐ 1 - 2 times per month
   - ☐ Less than 1 time per month
   - ☐ Never

Section 2: Purchase Simulation

For each question, imagine that it is mid-afternoon and you are hungry. You are stuck away from home but you have a short break. You have decided that you would like a snack to keep you going a few more hours until supper. You have walked to a nearby vending machine with the sole purpose of buying a snack..

Please examine each possible choice and choose one option that closely reflects your real decision. Keep in mind that, in a real-life situation, you are paying for the product that you choose. Suppose they are the only two options, so if you choose the "none" option you are choosing to leave with nothing and to continue your day without food until supper.

Please answer each question. Each question is an independent scenario.

Question 1

Features	**Option A**	**Option B**	**Option C**
Brand and Product	Baked! Lay's Original Potato Crisps	Cheetos® Puffs Cheese Flavoured Snacks	
Price	$1.25 for 60 g bag.	$1.75 for 60 g bag.	
Nutrition Facts	**Nutrition Facts / Valeur nutritive** Per 1 package (60 g) / pour 1 paquet (60 g) Amount / Teneur — % Daily Value / % valeur quotidienne **Calories / Calories** 240 **Fat / Lipides** 3 g — **5 %** Saturated / saturés 1 g + Trans / trans 0 g — **4 %** **Cholesterol / Cholestérol** 0 mg — **0 %** **Sodium / Sodium** 320 mg — **13 %** **Carbohydrate / Glucides** 49 g — **17 %** Fibre / Fibres 3 g — **14 %** Sugars / Sucres 4 g **Protein / Protéines** 4 g Vitamin A / Vitamine A — 0 % Vitamin C / Vitamine C — 8 % Calcium / Calcium — 8 % Iron / Fer — 6 %	**Nutrition Facts / Valeur nutritive** Per 1 package (60 g) / pour 1 paquet (60 g) Amount / Teneur — % Daily Value / % valeur quotidienne **Calories / Calories** 350 **Fat / Lipides** 22 g — **37%** Saturated / saturés 4 g + Trans / trans 0 g — **22 %** **Cholesterol / Cholesterol** 4 mg — **2 %** **Sodium / Sodium** 520 mg — **22 %** **Carbohydrate / Glucides** 31 g — **10 %** Fibre / Fibres 1 g — **4 %** Sugars / Sucres 2 g **Protein / Protéines** 4 g Vitamin A / Vitamine A — 8 % Vitamin C / Vitamine C — 0 % Calcium / Calcium — 3 % Iron / Fer — 5 % Thiamine / Thiamine — 8 % Riboflavin / Riboflavine — 8 % Niacin / Niacine — 5 % Folate / Folate — 24 %	None.
I would choose: (Please mark only one box)→	☐	☐	☐

Question 2

Features	Option A	Option B	Option C
Brand and Product	Cheetos® Puffs Cheese Flavoured Snacks	Rold Gold® Pretzels	
Price	$1.25 for 60 g bag.	$1.75 for 60 g bag.	
Nutrition Facts	**Nutrition Facts / Valeur nutritive** Per 1 package (60 g) / pour 1 paquet (60 g) Amount / Teneur — % Daily Value / % valeur quotidienne **Calories / Calories** 350 **Fat / Lipides** 22 g — 37% Saturated / saturés 4 g + Trans / trans 0 g — 22% **Cholesterol / Cholestérol** 4 mg — 2% **Sodium / Sodium** 520 mg — 22% **Carbohydrate / Glucides** 31 g — 10% Fibre / Fibres 1 g — 4% Sugars / Sucres 2 g **Protein / Protéines** 4 g Vitamin A / Vitamine A — 8% Vitamin C / Vitamine C — 0% Calcium / Calcium — 3% Iron / Fer — 5% Thiamine / Thiamine — 8% Riboflavin / Riboflavine — 8% Niacin / Niacine — 5% Folate / Folate — 24%	**Nutrition Facts / Valeur nutritive** Per 1 package (60 g) / pour 1 paquet (60 g) Amount / Teneur — % Daily Value / % valeur quotidienne **Calories / Calories** 230 **Fat / Lipides** 1 g — 2% Saturated / saturés 0.3 g + Trans / trans 0 g — 11% **Cholesterol / Cholestérol** 0 mg — 0% **Sodium / Sodium** 1190 mg — 49% **Carbohydrate / Glucides** 49 g — 16% Fibre / Fibres 2 g — 11% Sugars / Sucres 2 g **Protein / Protéines** 5 g Vitamin A / Vitamine A — 0% Vitamin C / Vitamine C — 0% Calcium / Calcium — 2% Iron / Fer — 17%	None.
I would choose: (Please mark only one box)→	☐	☐	☐

Question 3

Features	**Option A**	**Option B**	**Option C**
Brand and Product	Doritos® Tortilla chips Nacho Cheese Flavor	Baked! Doritos® Tortilla chips, Nacho Cheese Flavor	
Price	$1.50 for 60 g bag.	$1.25 for 60 g bag.	
Nutrition Facts	**Nutrition Facts / Valeur nutritive** Per 1 package (60 g) / pour 1 paquet (60 g) Amount / Teneur — % Daily Value / % valeur quotidienne **Calories / Calories** 310 **Fat / Lipides** 16 g — 24 % Saturated / saturés 2 g + Trans / trans 0.2 g — 11 % **Cholesterol / Cholestérol** 0 mg — 0 % **Sodium / Sodium** 430 mg — 18 % **Carbohydrate / Glucides** 38 g — 13 % Fibre / Fibres 3 g — 11 % Sugars / Sucres 1 g **Protein / Proteines** 4 g Vitamin A / Vitamine A — 1 % Vitamin C / Vitamine C — 1 % Calcium / Calcium — 7 % Iron / Fer — 4 %	**Nutrition Facts / Valeur nutritive** Per 1 package (60 g) / pour 1 paquet (60 g) Amount / Teneur — % Daily Value / % valeur quotidienne **Calories / Calories** 260 **Fat / Lipides** 7 g — 11% Saturated / saturés 1 g + Trans / trans 0 g — 6 % **Cholesterol / Cholesterol** 5 mg — 2 % **Sodium / Sodium** 470 mg — 20 % **Carbohydrate / Glucides** 46 g — 16 % Fibre / Fibres 4 g — 15 % Sugars / Sucres 2 g **Protein / Proteines** 5 g Vitamin A / Vitamine A — 7 % Vitamin C / Vitamine C — 0 % Calcium / Calcium — 10 % Iron / Fer — 12 %	None.
I would choose: (Please mark only one box)→	☐	☐	☐

Question 4

Features	**Option A**	**Option B**	**Option C**
Brand and Product	Sunchips® Multigrain Snack Harvest Cheddar Flavour	Dutch Crunch® Kettle Cooked Chips, Mesquite BBQ	
Price	$1.75 for 60 g bag.	$1.75 for 60 g bag.	
Nutrition Facts	**Nutrition Facts / Valeur nutritive** Per 1 package (60 g) / pour 1 paquet (60 g) Amount / Teneur — % Daily Value / % valeur quotidienne **Calories / Calories** 290 **Fat / Lipides** 13 g — 19 % Saturated / saturés 1.5 g + Trans / trans 0 g — 8 % **Cholesterol / Cholestérol** 0 mg — 0 % **Sodium / Sodium** 420 mg — 18 % **Carbohydrate / Glucides** 40 g — 13 % Fibre / Fibres 3 g — 14 % Sugars / Sucres 4 g **Protein / Protéines** 5 g Vitamin A / Vitamine A — 0 % Vitamin C / Vitamine C — 0 % Calcium / Calcium — 2 % Iron / Fer — 8 %	**Nutrition Facts / Valeur nutritive** Per 1 package (60 g) / pour 1 paquet (60 g) Amount / Teneur — % Daily Value / % valeur quotidienne **Calories / Calories** 290 **Fat / Lipides** 14 g — 21 % Saturated / saturés 1.5 g + Trans / trans 0 g — 8 % **Cholesterol / Cholestérol** 0 mg — 0 % **Sodium / Sodium** 600 mg — 25 % **Carbohydrate / Glucides** 38 g — 13 % Fibre / Fibres 2 g — 11 % Sugars / Sucres 3 g **Protein / Protéines** 3 g Vitamin A / Vitamine A — 1 % Vitamin C / Vitamine C — 15 % Calcium / Calcium — 3 % Iron / Fer — 8 % Vitamin E / Vitamine E — 19 %	None.
I would choose: (Please mark only one box)→	☐	☐	☐

Question 5

Features	**Option A**	**Option B**	**Option C**
Brand and Product	Baked! Doritos® Tortilla chips, Nacho Cheese Flavor	Lay's® Potato Chips Classic	
Price	$1.25 for 60 g bag.	$1.25 for 60 g bag.	
Nutrition Facts	**Nutrition Facts** **Valeur nutritive** Per 1 package (60 g) pour 1 paquet (60 g) **Amount / Teneur** — **% Daily Value / % valeur quotidienne** **Calories / Calories** 260 **Fat / Lipides** 7 g — **11%** Saturated / saturés 1 g + Trans / trans 0 g — **6 %** **Cholesterol / Cholestérol** 5 mg — **2 %** **Sodium / Sodium** 470 mg — **20 %** **Carbohydrate / Glucides** 46 g — **16 %** Fibre / Fibres 4 g — **15 %** Sugars / Sucres 2 g **Protein / Protéines** 5 g Vitamin A / Vitamine A — 7 % Vitamin C / Vitamine C — 0 % Calcium / Calcium — 10 % Iron / Fer — 12 %	**Nutrition Facts** **Valeur nutritive** Per 1 package (60 g) pour 1 paquet (60 g) **Amount / Teneur** — **% Daily Value / % valeur quotidienne** **Calories / Calories** 340 **Fat / Lipides** 22 g — **34 %** Saturated / saturés 2 g + Trans / trans 0.2 g — **12 %** **Cholesterol / Cholestérol** 0 mg — **0 %** **Sodium / Sodium** 400 mg — **17 %** **Carbohydrate / Glucides** 31 g — **10 %** Fibre / Fibres 1 g — **5 %** Sugars / Sucres 0 g — – **Protein / Protéines** 4 g Vitamin A / Vitamine A — 0 % Vitamin C / Vitamine C — 24 % Calcium / Calcium — 2 % Iron / Fer — 5 % **WARNING** Excessive consumption of this product may lead to obesity and associated health problems. This product has been taxed due to its less healthy nutritional content. Health Canada	None.
I would choose: (Please mark only one box)→	☐	☐	☐

Question 6

Features	**Option A**	**Option B**	**Option C**
Brand and Product	Dutch Crunch® Kettle Cooked Chips, Mesquite BBQ	Baked! Lay's Original Potato Crisps	
Price	$1.75 for 60 g bag.	$1.50 for 60 g bag.	
Nutrition Facts	**Nutrition Facts / Valeur nutritive** Per 1 package (60 g) / pour 1 paquet (60 g) **Amount / Teneur** — **% Daily Value / % valeur quotidienne** **Calories / Calories** 290 **Fat / Lipides** 14 g — **21 %** Saturated / saturés 1.5 g + Trans / trans 0 g — **8 %** **Cholesterol / Cholestérol** 0 mg — **0 %** **Sodium / Sodium** 600 mg — **25 %** **Carbohydrate / Glucides** 38 g — **13 %** Fibre / Fibres 2 g — **11 %** Sugars / Sucres 3 g **Protein / Protéines** 3 g Vitamin A / Vitamine A — 1 % Vitamin C / Vitamine C — 15 % Calcium / Calcium — 3 % Iron / Fer — 8 % Vitamin E / Vitamine E — 19 % **WARNING** Excessive consumption of this product may lead to obesity and associated health problems. This product has been taxed due to its less healthy nutritional content. Health Canada	**Nutrition Facts / Valeur nutritive** Per 1 package (60 g) / pour 1 paquet (60 g) **Amount / Teneur** — **% Daily Value / % valeur quotidienne** **Calories / Calories** 240 **Fat / Lipides** 3 g — **5 %** Saturated / saturés 1 g + Trans / trans 0 g — **4 %** **Cholesterol / Cholestérol** 0 mg — **0 %** **Sodium / Sodium** 320 mg — **13 %** **Carbohydrate / Glucides** 49 g — **17 %** Fibre / Fibres 3 g — **14 %** Sugars / Sucres 4 g **Protein / Protéines** 4 g Vitamin A / Vitamine A — 0 % Vitamin C / Vitamine C — 8 % Calcium / Calcium — 8 % Iron / Fer — 6 %	None.
I would choose: (Please mark only one box)→	☐	☐	☐

Question 7

Features	**Option A**	**Option B**	**Option C**
Brand and Product	Sunchips® Multigrain Snack Harvest Cheddar Flavour	Lay's® Potato Chips Classic	
Price	$1.75 for 60 g bag.	$1.50 for 60 g bag.	
Nutrition Facts	**Nutrition Facts** **Valeur nutritive** Per 1 package (60 g) pour 1 paquet (60 g) Amount / Teneur — % Daily Value / % valeur quotidienne **Calories / Calories** 290 **Fat / Lipides** 13 g — **19 %** Saturated / saturés 1.5 g + Trans / trans 0 g — **8 %** **Cholesterol / Cholestérol** 0 mg — **0 %** **Sodium / Sodium** 420 mg — **18 %** **Carbohydrate / Glucides** 40 g — **13 %** Fibre / Fibres 3 g — **14 %** Sugars / Sucres 4 g **Protein / Protéines** 5 g Vitamin A / Vitamine A — 0 % Vitamin C / Vitamine C — 0 % Calcium / Calcium — 2 % Iron / Fer — 8 %	**Nutrition Facts** **Valeur nutritive** Per 1 package (60 g) pour 1 paquet (60 g) Amount / Teneur — % Daily Value / % valeur quotidienne **Calories / Calories** 340 **Fat / Lipides** 22 g — **34 %** Saturated / saturés 2 g + Trans / trans 0.2 g — **12 %** **Cholesterol / Cholesterol** 0 mg — **0 %** **Sodium / Sodium** 400 mg — **17 %** **Carbohydrate / Glucides** 31 g — **10 %** Fibre / Fibres 1 g — **5 %** Sugars / Sucres 0 g **Protein / Protéines** 4 g Vitamin A / Vitamine A — 0 % Vitamin C / Vitamine C — 24 % Calcium / Calcium — 2 % Iron / Fer — 5 % WARNING Excessive consumption of this product may lead to obesity and associated health problems. This product has been taxed due to its less healthy nutritional content. Health Canada	None.
I would choose: (Please mark only one box)→	☐	☐	☐

Question 8

Features	**Option A**	**Option B**	**Option C**
Brand and Product	Rold Gold® Pretzels	Doritos® Tortilla chips Nacho Cheese Flavor	
Price	$1.50 for 60 g bag.	$1.50 for 60 g bag.	
Nutrition Facts	**Nutrition Facts** **Valeur nutritive** Per 1 package (60 g) pour 1 paquet (60 g) Amount / Teneur — % Daily Value / % valeur quotidienne **Calories / Calories** 230 **Fat / Lipides** 1 g — 2 % Saturated / saturés 0.3 g + Trans / trans 0 g — 11 % **Cholesterol / Cholestérol** 0 mg — 0 % **Sodium / Sodium** 1190 mg — 49 % **Carbohydrate / Glucides** 49 g — 16 % Fibre / Fibres 2 g — 11 % Sugars / Sucres 2 g **Protein / Protéines** 5 g Vitamin A / Vitamine A — 0 % Vitamin C / Vitamine C — 0 % Calcium / Calcium — 2 % Iron / Fer — 17 %	**Nutrition Facts** **Valeur nutritive** Per 1 package (60 g) pour 1 paquet (60 g) Amount / Teneur — % Daily Value / % valeur quotidienne **Calories / Calories** 310 **Fat / Lipides** 16 g — 24 % Saturated / saturés 2 g + Trans / trans 0.2 g — 11 % **Cholesterol / Cholestérol** 0 mg — 0 % **Sodium / Sodium** 430 mg — 18 % **Carbohydrate / Glucides** 38 g — 13 % Fibre / Fibres 3 g — 11 % Sugars / Sucres 1 g **Protein / Protéines** 4 g Vitamin A / Vitamine A — 1 % Vitamin C / Vitamine C — 1 % Calcium / Calcium — 7 % Iron / Fer — 4 % **WARNING** Excessive consumption of this product may lead to obesity and associated health problems. This product has been taxed due to its less healthy nutritional content. Health Canada	None.
I would choose: (Please mark only one box)→	☐	☐	☐

Section 3: Health Questions

Each item below is a belief statement about your medical condition with which you may agree or disagree. Beside each statement is a scale which ranges from strongly disagree (1) to strongly agree (6). For each item we would like you to circle the number that represents the extent to which you agree or disagree with that statement. The more you agree with a statement, the higher will be the number you circle. The more you disagree with a statement, the lower will be the number you circle. Please make sure that you answer **EVERY ITEM** and that you circle **ONLY ONE** number per item. This is a measure of your personal beliefs; obviously, there are no right or wrong answers.

1=STRONGLY DISAGREE **(SD)**	4=SLIGHTLY AGREE **(A)**
2=MODERATELY DISAGREE **(MD)**	5=MODERATELY AGREE **(MA)**
3=SLIGHTLY DISAGREE **(D)**	6=STRONGLY AGREE **(SA)**

		SD	MD	D	A	MA	SA
1	If I get sick, it is my own behavior which determines how soon I get well again.	1	2	3	4	5	6
2	No matter what I do, if I am going to get sick, I will get sick.	1	2	3	4	5	6
3	Having regular contact with my physician is the best way for me to avoid illness.	1	2	3	4	5	6
4	Most things that affect my health happen to me by accident.	1	2	3	4	5	6
5	Whenever I don't feel well, I should consult a medically trained professional.	1	2	3	4	5	6
6	I am in control of my health.	1	2	3	4	5	6
7	My family has a lot to do with my becoming sick or staying healthy.	1	2	3	4	5	6
8	When I get sick, I am to blame.	1	2	3	4	5	6
9	Luck plays a big part in determining how soon I will recover from an illness.	1	2	3	4	5	6
10	Health professionals control my health.	1	2	3	4	5	6
11	My good health is largely a matter of good fortune.	1	2	3	4	5	6
12	The main thing which affects my health is what I myself do.	1	2	3	4	5	6
13	If I take care of myself, I can avoid illness.	1	2	3	4	5	6
14	Whenever I recover from an illness, it's usually because other people (for example, doctors, nurses, family, friends) have been taking good care of me.	1	2	3	4	5	6
15	No matter what I do, I 'm likely to get sick.	1	2	3	4	5	6
16	If it's meant to be, I will stay healthy.	1	2	3	4	5	6
17	If I take the right actions, I can stay healthy.	1	2	3	4	5	6
18	Regarding my health, I can only do what my doctor tells me to do.	1	2	3	4	5	6

Section 4: More Health Questions

1. On average, how often do you exercise? **Please check one only**

   ☐ 5 or more times per week
   ☐ 3 - 4 times per week
   ☐ 1 - 2 times per week
   ☐ Less than 1 time per week

2. What type(s) of exercise do you do most frequently? **Please check all that apply**

   ☐ Walking for exercise
   ☐ Gardening/yard work
   ☐ Swimming
   ☐ Bicycling/skateboarding/rollerblading
   ☐ Dance
   ☐ Home exercises/calisthenics (e.g. push-ups, sit-ups, etc.)
   ☐ Competitive sports, please specify _____
   ☐ Jogging or running
   ☐ Exercise class/aerobics
   ☐ Skiing/snowboarding
   ☐ Weight-training
   ☐ Other, please specify _____

3. How often do you read nutrition labels before purchasing a food product? **Please check one only**

   ☐ Almost always
   ☐ More often than not
   ☐ Rarely
   ☐ Never

4. Have you been advised by a health care professional to be watching your diet?

   ☐ Yes
   Please specify (e.g. limit sodium, increase fibre, etc.)

   _____

   ☐ No

Section 5: Demographic Information

The purpose of this section is to find out more about you. Please remember that your answers will be kept strictly confidential and your name will not be linked to your answers in any way.

1. Are you male or female?

   ☐ Male
   ☐ Female

2. What is your age?

   _____ years

3. How many people, including yourself, live in your household?

   _____

4. How many people under the age of 18 years live in your household?

   _____

5. What is the highest level of education that you have completed? **Please check one only**

   ☐ Never attended school
   ☐ Grade school (grades 1 to 9)
   ☐ Some high school
   ☐ High school graduate
   ☐ Post secondary trade or technical school certificate/degree
   ☐ Some university or college
   ☐ College diploma/degree
   ☐ University undergraduate degree
   ☐ Some post graduate university study
   ☐ Post graduate university degree (e.g., Masters or Ph.D.)

6. Which of the following best describes your employment status? **Please check one only**

- ☐ Working full- or part-time
  Please specify occupation _____
- ☐ Full- or part-time student
  Please specify program/major _____
- ☐ Do unpaid work from home/ homemaker
- ☐ Between jobs
- ☐ Self-employed
- ☐ Retired

7. What is your total household income before taxes? (Note: Consider them part of your household if you eat meals together.) **Please check one only**

- ☐ Less that $10 000
- ☐ $10 000 - $19 999
- ☐ $20 000 - $29 999
- ☐ $30 000 - $39 999
- ☐ $40 000 - $49 999
- ☐ $50 000 - $59 999
- ☐ $60 000 - $69 999
- ☐ $70 000 - $79 999
- ☐ $80 000 - $89 999
- ☐ $90 000 - $99 999
- ☐ $100 000 or more

8. What is your height? **Please fill in one of the boxes**

_____ feet and _____ inches	**or**	_____ centimetres

9. What is your weight? **Please fill in one of the boxes**

_____ pounds	**or**	_____ kilograms

Thank you for your participation.

To compensate you for the time you spent answering this survey, we would like to give you a gift certificate. To receive your gift, please inform one of us that you have completed the survey.

Please note that the warning labels seen in this survey were created by the researchers and are not endorsed by Health Canada in any way.

Please feel free to provide us with any comments you may have in the space below.

_____

_____

_____

_____

_____

_____

Appendix B: Example Mod_Survey Code

index.survey

```
<SURVEY TITLE="Snacks">

<CUSTOM ESCAPED="no">
 <H1>Snack food survey</H1>

<img align="centre" src="pics/junk food.JPG">

 <h3><b>Section 1: Introduction and consent</b></h3>

 <P>Welcome and thank you for taking part in this research!</P>

 This is part of a study conducted by the University of Alberta
in
 Edmonton, Alberta. This study is funded by {[}br{]} Social
Sciences and Humanities Research Council of Canada, Research
Development Initiative (SSHRC-RDI) {[}br{]} program and
Agricultural and Agri-Food Canada's Agricultural Policy Research
Network in Consumer and {[}br{]}  Market Demand.

 <p> In this survey, we are interested in knowing about your
snack food purchasing behaviour.</P>

 <p><b>We ask that you complete all parts of the survey.</b> If
you
  have any questions, please feel free to contact us.<br>Our
contact information is given on your information sheet.</P>

</CUSTOM>
<ROUTE CONTINUE="consent.survey"/>

     </SURVEY>
```

consent.survey

```
<SURVEY TITLE="Snack food questionnaire">

<CUSTOM ESCAPED="no">
 <H2>Consent</H2>
<h3>Researchers:</h3>
<img align="centre" src="pics/consent.jpg">
 <br><br>
</CUSTOM>


<CHOICE NAME="consent1" CAPTION="Do you understand that you have
been asked to participate in a survey on snacks?">
<CHOICEELEMENT VALUE="1" CAPTION="Yes" />
<CHOICEELEMENT VALUE="2" CAPTION="No" />
</CHOICE>

<CHOICE NAME="consent2" CAPTION="Do you understand the benefits
and risks involved in taking part in this research study?">
```

```
<CHOICEELEMENT VALUE="1" CAPTION="Yes" />
<CHOICEELEMENT VALUE="2" CAPTION="No" />
</CHOICE>

<CHOICE NAME="consent3" CAPTION="Have you read and received a
copy of the Information Sheet?">
<CHOICEELEMENT VALUE="1" CAPTION="Yes" />
<CHOICEELEMENT VALUE="2" CAPTION="No" />
</CHOICE>

<CHOICE NAME="consent4" CAPTION="Do you understand that you can
choose to not participate in this study or you can choose to
withdraw at any point during the questionnaire?">
<CHOICEELEMENT VALUE="1" CAPTION="Yes" />
<CHOICEELEMENT VALUE="2" CAPTION="No" />
</CHOICE>

<CHOICE NAME="consent5" CAPTION="Do you understand that the
information that you provide will be kept in strict confidence
and that there will be no link between your responses and your
name/address?">
<CHOICEELEMENT VALUE="1" CAPTION="Yes" />
<CHOICEELEMENT VALUE="2" CAPTION="No" />
</CHOICE>

<CHOICE NAME="consent6" CAPTION="Do you give us (the researchers)
permission to use the data that you provided for the purposes
specified in the information sheet?">
<CHOICEELEMENT VALUE="1" CAPTION="Yes" />
<CHOICEELEMENT VALUE="2" CAPTION="No" />
</CHOICE>

<CHOICE NAME="consent7" CAPTION="Do you give us permission to
share the data that you provided with the researchers listed on
this consent form?              ">
<CHOICEELEMENT VALUE="1" CAPTION="Yes" />
<CHOICEELEMENT VALUE="2" CAPTION="No" />
</CHOICE>

<CHOICE NAME="consent8" MUSTANSWER="yes" CAPTION="I agree to take
part in this study.">
<CHOICEELEMENT VALUE="1" CAPTION="Yes" />
<CHOICEELEMENT VALUE="2" CAPTION="No" />
</CHOICE>

<ROUTE CONTINUE="2.survey"/>

    </SURVEY>
```

2.sruvey

```
<SURVEY TITLE="Snack food questionnaire">

<CUSTOM ESCAPED="no">
<h3>Section 1: Usual snack food purchases</h3></CUSTOM>
```

```
<CHOICE NAME="snacks" CAPTION="1. What types of snack food
products do you buy regularly? Please select all that
apply" MULTI="yes" OTHERFIELD="Other, please specify:">
<CHOICEELEMENT VALUE="1" CAPTION="Potato chips" />
<CHOICEELEMENT VALUE="2" CAPTION="Corn chips" />
<CHOICEELEMENT VALUE="3" CAPTION="Cheese puffs" />
<CHOICEELEMENT VALUE="4" CAPTION="Pretzels" />
<CHOICEELEMENT VALUE="5" CAPTION="Popcorn" />
<CHOICEELEMENT VALUE="6" CAPTION="Chocolate bars" />
<CHOICEELEMENT VALUE="7" CAPTION="Cookies/Crackers" />
<CHOICEELEMENT VALUE="8" CAPTION="Candy (jelly beans, lollipop,
etc.)" />
<CHOICEELEMENT VALUE="9" CAPTION="Ice Cream" />
</CHOICE>

<CHOICE NAME="often" MUSTANSWER="yes" CAPTION="2. How often do
you buy snack food products (listed in Question 1) that you
intend to consume
within an hour of purchase?">
<CHOICEELEMENT VALUE="1" CAPTION="5 or more times per week" />
<CHOICEELEMENT VALUE="2" CAPTION="2 - 4 times per week" />
<CHOICEELEMENT VALUE="3" CAPTION="3 - 4 times per month" />
<CHOICEELEMENT VALUE="4" CAPTION="1 - 2 times per month" />
<CHOICEELEMENT VALUE="5" CAPTION="less than 1 time per month" />
</CHOICE>

<CHOICE NAME="later" MUSTANSWER="yes" CAPTION="3. How often do
you buy snack food products (listed in Question 1) for future
consumption?">
<CHOICEELEMENT VALUE="1" CAPTION="5 or more times per week" />
<CHOICEELEMENT VALUE="2" CAPTION="2 - 4 times per week" />
<CHOICEELEMENT VALUE="3" CAPTION="3 - 4 times per month" />
<CHOICEELEMENT VALUE="4" CAPTION="1 - 2 times per month" />
<CHOICEELEMENT VALUE="5" CAPTION="less than 1 time per month" />
</CHOICE>

<DATETIME NAME="time" />

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</SURVEY>
```

choice.survey

```
<SURVEY TITLE="Snack food questionnaire">
<CUSTOM ESCAPED="no">

<h3>Section 2: Purchase Simulation</h3>

For each question, imagine that it is mid-afternoon and you are
hungry. You are stuck away from home but {[}br{]} you have a
short
break. You have decided that you would like a snack to keep you
going
a few more hours {[}br{]} until supper. You have walked to a
nearby
vending machine with the sole purpose of buying a snack.
<br><br>
```

```
Please examine each possible choice and choose one option that
closely reflects your real decision. Keep in {[}br{]} mind that,
in a real-life situation, you are paying for the product that you
choose. Suppose there are only {[}br{]} two options, so if you
choose the "none" option you are choosing to leave with nothing
and to continue your {[}br{]} day without food until supper.
<br><br>
Please answer each question. Each question is an independent
scenario.

</CUSTOM>

<ROUTE CONTINUE="choice1-1.survey"/>
</SURVEY>
```

choice1-1.survey

```
<SURVEY TITLE="Snack food questionnaire">

<CUSTOM ESCAPED="no">

<img align="centre" src="pics/1-1.jpg">

</CUSTOM>

<ROUTE CONTINUE="choice2.survey"/>

<CUSTOM ESCAPED="no">
<br><br><br>
</CUSTOM>

<CHOICE MUSTANSWER="yes" NAME="choice11" CAPTION="I would
choose">
<CHOICEELEMENT VALUE="1" CAPTION="Option A" />
<CHOICEELEMENT VALUE="2" CAPTION="Option B" />
<CHOICEELEMENT VALUE="3" CAPTION="Option C (none)" />
</CHOICE>
<ROUTE CONTINUE="choice1-2.survey"/>

</SURVEY>
```

choice1-2.survey

```
<SURVEY TITLE="Snack food questionnaire">

<CUSTOM ESCAPED="no">

<img align="centre" src="pics/1-2.jpg">

</CUSTOM>

<ROUTE CONTINUE="choice2.survey"/>

<CUSTOM ESCAPED="no">
<br><br><br>
</CUSTOM>
```

```
<CHOICE NAME="choice12" CAPTION="I would choose">
<CHOICEELEMENT VALUE="1" CAPTION="Option A" />
<CHOICEELEMENT VALUE="2" CAPTION="Option B" />
<CHOICEELEMENT VALUE="3" CAPTION="Option C (none)" />
</CHOICE>
<ROUTE CONTINUE="choice1-3.survey"/>

</SURVEY>
```

choice1-3.survey

```
<SURVEY TITLE="Snack food questionnaire">

<CUSTOM ESCAPED="no">

<img align="centre" src="pics/1-3.jpg">

</CUSTOM>

<ROUTE CONTINUE="choice2.survey"/>

<CUSTOM ESCAPED="no">
<br><br><br>
</CUSTOM>

<CHOICE NAME="choice13" CAPTION="I would choose">
<CHOICEELEMENT VALUE="1" CAPTION="Option A" />
<CHOICEELEMENT VALUE="2" CAPTION="Option B" />
<CHOICEELEMENT VALUE="3" CAPTION="Option C (none)" />
</CHOICE>
<ROUTE CONTINUE="choice1-4.survey"/>

</SURVEY>
```

choice1-4.survey

```
<SURVEY TITLE="Snack food questionnaire">

<CUSTOM ESCAPED="no">

<img align="centre" src="pics/1-4.jpg">

</CUSTOM>

<ROUTE CONTINUE="choice2.survey"/>

<CUSTOM ESCAPED="no">
<br><br><br>
</CUSTOM>

<CHOICE NAME="choice14" CAPTION="I would choose">
<CHOICEELEMENT VALUE="1" CAPTION="Option A" />
<CHOICEELEMENT VALUE="2" CAPTION="Option B" />
<CHOICEELEMENT VALUE="3" CAPTION="Option C (none)" />
</CHOICE>
<ROUTE CONTINUE="choice1-5.survey"/>
```

```
</SURVEY>
```

choice1-5.survey

```
<SURVEY TITLE="Snack food questionnaire">

<CUSTOM ESCAPED="no">

<img align="centre" src="pics/1-5.jpg">

</CUSTOM>

<ROUTE CONTINUE="choice2.survey"/>

<CUSTOM ESCAPED="no">
<br><br><br>
</CUSTOM>

<CHOICE MUSTANSWER="yes" NAME="choice15" CAPTION="I would
choose">
<CHOICEELEMENT VALUE="1" CAPTION="Option A" />
<CHOICEELEMENT VALUE="2" CAPTION="Option B" />
<CHOICEELEMENT VALUE="3" CAPTION="Option C (none)" />
</CHOICE>
<ROUTE CONTINUE="choice1-6.survey"/>

</SURVEY>
```

choice1-6.survey

```
<SURVEY TITLE="Snack food questionnaire">

<CUSTOM ESCAPED="no">

<img align="centre" src="pics/1-6.jpg">

</CUSTOM>

<ROUTE CONTINUE="choice2.survey"/>

<CUSTOM ESCAPED="no">
<br><br><br>
</CUSTOM>

<CHOICE MUSTANSWER="yes" NAME="choice16" CAPTION="I would
choose">
<CHOICEELEMENT VALUE="1" CAPTION="Option A" />
<CHOICEELEMENT VALUE="2" CAPTION="Option B" />
<CHOICEELEMENT VALUE="3" CAPTION="Option C (none)" />
</CHOICE>
<ROUTE CONTINUE="choice1-7.survey"/>

</SURVEY>
```

choice1-7.survey

```
<SURVEY TITLE="Snack food questionnaire">
```

```
<CUSTOM ESCAPED="no">

<img align="centre" src="pics/1-7.jpg">

</CUSTOM>

<ROUTE CONTINUE="choice2.survey"/>

<CUSTOM ESCAPED="no">
<br><br><br>
</CUSTOM>

<CHOICE MUSTANSWER="yes" NAME="choice17" CAPTION="I would
choose">
<CHOICEELEMENT VALUE="1" CAPTION="Option A" />
<CHOICEELEMENT VALUE="2" CAPTION="Option B" />
<CHOICEELEMENT VALUE="3" CAPTION="Option C (none)" />
</CHOICE>
<ROUTE CONTINUE="choice1-8.survey"/>

</SURVEY>
```

choice1-8.survey

```
<SURVEY TITLE="Snack food questionnaire">

<CUSTOM ESCAPED="no">

<img align="centre" src="pics/1-8.jpg">

</CUSTOM>

<ROUTE CONTINUE="choice2.survey"/>

<CUSTOM ESCAPED="no">
<br><br><br>
</CUSTOM>

<CHOICE NAME="choice18" CAPTION="I would choose">
<CHOICEELEMENT VALUE="1" CAPTION="Option A" />
<CHOICEELEMENT VALUE="2" CAPTION="Option B" />
<CHOICEELEMENT VALUE="3" CAPTION="Option C (none)" />
</CHOICE>
<ROUTE CONTINUE="3.survey"/>

</SURVEY>
```

3.survey

```
<SURVEY TITLE="Snack food questionnaire">
<CUSTOM ESCAPED="no">

<h3>Section 3: Health Questions</h3>
</CUSTOM>

<CUSTOM ESCAPED="no">
```

```
<p>Instructions: Each item below is a belief statement about your
medical condition with which you may agree {[}br{]} or
disagree. Beside each statement is a scale which ranges from
strongly
disagree (1) to strongly agree (6). {[}br{]} For each item we
would
like you to select the number that represents the extent to which
you agree or {[}br{]} disagree with that statement. The more you
agree with a statement, the higher will be the number you
{[}br{]} circle. The more you disagree with a statement, the
lower will be the number you circle. Please make sure {[}br{]}
that you answer EVERY ITEM and that you circle ONLY ONE number
per item. This is a measure of your {[}br{]} personal beliefs;
obviously, there are no right or wrong answers.
</p>

<img align="centre" src="pics/MHLCscale.JPG">

</CUSTOM>
<MATRIX MUSTANSWER="yes" NAME="mhlc" BORDER="yes">
<MATRIXCOLUMN VALUE="1" CAPTION="1" />
<MATRIXCOLUMN VALUE="2" CAPTION="2" />
<MATRIXCOLUMN VALUE="3" CAPTION="3" />
<MATRIXCOLUMN VALUE="4" CAPTION="4" />
<MATRIXCOLUMN VALUE="5" CAPTION="5" />
<MATRIXCOLUMN VALUE="6" CAPTION="6" />
<MATRIXROW CAPTION="1. If I get sick, it is my own behaviour
which determines how soon I get well again." />
<MATRIXROW CAPTION="2. No matter what I do, if I am going to get
sick, I will get sick." />
<MATRIXROW CAPTION="3. Having regular contact with my physician
is the best way for me to avoid illness." />
<MATRIXROW CAPTION="4. Most things that affect my health happen
to me by accident." />
<MATRIXROW CAPTION="5. Whenever I don't feel well, I should
consult a medically trained professional." />
<MATRIXROW CAPTION="6. I am in control of my health." />
<MATRIXROW CAPTION="7. My family has a lot to do with my becoming
sick or staying healthy." />
<MATRIXROW CAPTION="8. When I get sick, I am to blame." />
<MATRIXROW CAPTION="9. Luck plays a big part in determining how
soon I will recover from an illness." />
<MATRIXROW CAPTION="10. Health professionals control my health."
/>
<MATRIXROW CAPTION="11. My good health is largely a matter of
good fortune." />
<MATRIXROW CAPTION="12. The main thing which affects my health is
what I myself do." />
<MATRIXROW CAPTION="13. If I take care of myself, I can avoid
illness." />
<MATRIXROW CAPTION="14. Whenever I recover from an illness, it's
usually because other people (for example, doctors, nurses,
family, friends) have been taking good care of me." />
<MATRIXROW CAPTION="15. No matter what I do, I 'm likely to get
sick." />
<MATRIXROW CAPTION="16. If it's meant to be, I will stay
healthy." />
```

```
<MATRIXROW CAPTION="17. If I take the right actions, I can stay
healthy." />
<MATRIXROW CAPTION="18. Regarding my health, I can only do what
my doctor tells me to do." />
</MATRIX>
<ROUTE CONTINUE="4.survey"/>
</SURVEY>
```

4.survey

```
<SURVEY TITLE="Snack food questionnaire">
<CHOICE MUSTANSWER="yes" NAME="exercise" CAPTION="On average, how
often do you exercise?">
<CHOICEELEMENT VALUE="1" CAPTION="5 or more times per week" />
<CHOICEELEMENT VALUE="2" CAPTION="3 - 4 times per week" />
<CHOICEELEMENT VALUE="3" CAPTION="1 - 2 times per week" />
<CHOICEELEMENT VALUE="4" CAPTION="less than 1 time per week" />
</CHOICE>
<ROUTE CONTINUE="5.survey"/>
</SURVEY>
```

5.survey

```
<SURVEY TITLE="Snack food questionnaire">
<CHOICE NAME="extype" CAPTION="What type(s) of exercise do you do
most frequently? Please check all that apply" MULTI="yes"
OTHERFIELD="Other, please specify:">
<CHOICEELEMENT VALUE="1" CAPTION="Walking for exercise" />
<CHOICEELEMENT VALUE="2" CAPTION="Gardening/yard work" />
<CHOICEELEMENT VALUE="3" CAPTION="Swimming" />
<CHOICEELEMENT VALUE="4"
CAPTION="Bicycling/skateboarding/rollerblading" />
<CHOICEELEMENT VALUE="5" CAPTION="Dance" />
<CHOICEELEMENT VALUE="6" CAPTION="Home exercises/calisthenics
(e.g. push-ups, sit ups, etc.)" />
<CHOICEELEMENT VALUE="7" CAPTION="Competitive sports" />
<CHOICEELEMENT VALUE="8" CAPTION="Jogging or running" />
<CHOICEELEMENT VALUE="9" CAPTION="Exercise class/aerobics" />
<CHOICEELEMENT VALUE="10" CAPTION="Skiing/snowboarding" />
<CHOICEELEMENT VALUE="11" CAPTION="Weight-training" />
</CHOICE>
<ROUTE CONTINUE="6.survey"/>
</SURVEY>
```

6.survey

```
<SURVEY TITLE="Snack food questionnaire">

<CHOICE MUSTANSWER="yes" NAME="labels" CAPTION="How often do you
read nutrition labels before purchasing a food product?">
<CHOICEELEMENT VALUE="1" CAPTION="Almost always" />
<CHOICEELEMENT VALUE="2" CAPTION="More often than not" />
<CHOICEELEMENT VALUE="3" CAPTION="Rarely" />
<CHOICEELEMENT VALUE="4" CAPTION="Never" />
</CHOICE>

<ROUTE CONTINUE="7.survey"/>
```

```
</SURVEY>
```

7.survey

```
<SURVEY TITLE="Snack food questionnaire">

<CHOICE MUSTANSWER="yes" NAME="diet" CAPTION="Have you been
advised by a health care professional to be watching your diet?"
OTHERFIELD="Yes, please specify (e.g. limit sodium, increase
fibre, etc.):">
<CHOICEELEMENT VALUE="2" CAPTION="No" />
</CHOICE>
<ROUTE CONTINUE="8.survey"/>
</SURVEY>
```

8.survey

```
<SURVEY TITLE="Snack food questionnaire">

<CUSTOM ESCAPED="no">
<h3>Seciton 4: Demographics</h3>
<p>The purpose of this section is to find out more about you.
Please remember that your answers will be kept <br>strictly
confidential and your name will not be linked to your answers in
any way.</p>

</CUSTOM>
<CHOICE MUSTANSWER="yes" NAME="gender" CAPTION="Are you male or
female?">
<CHOICEELEMENT VALUE="0" CAPTION="male" />
<CHOICEELEMENT VALUE="1" CAPTION="female" />
</CHOICE>

<ROUTE CONTINUE="9.survey"/>
</SURVEY>
```

9.survey

```
<SURVEY TITLE="Snack food questionnaire">
<TEXT MUSTANSWER="yes" NAME="age" CAPTION="What is your age?"
NUMERICAL="yes" />

<ROUTE CONTINUE="10.survey"/>
</SURVEY>
```

10.survey

```
<SURVEY TITLE="Snack food questionnaire">

<TEXT MUSTANSWER="yes" NAME="house" CAPTION="How many people,
including yourself, live in your household?" NUMERICAL="yes" />

<ROUTE CONTINUE="11.survey"/>
</SURVEY>
```

11.survey

```
<SURVEY TITLE="Snack food questionnaire">

<TEXT MUSTANSWER="yes" NAME="children" CAPTION="How many people
under the age of 18 years live in your household?"
NUMERICAL="yes"
/>

<ROUTE CONTINUE="12.survey"/>
</SURVEY>
```

12.survey

```
<SURVEY TITLE="Snack food questionnaire">

<CHOICE MUSTANSWER="yes" NAME="school" CAPTION="What is the
highest level of education that you have completed?">
<CHOICEELEMENT VALUE="1" CAPTION="Never attended school" />
<CHOICEELEMENT VALUE="2" CAPTION="Grade school (grades 1 to 9)"
/>
<CHOICEELEMENT VALUE="3" CAPTION="Some high school" />
<CHOICEELEMENT VALUE="4" CAPTION="High school graduate" />
<CHOICEELEMENT VALUE="5" CAPTION="Post secondary trade or
technical school certificate/degree" />
<CHOICEELEMENT VALUE="6" CAPTION="Some university or college" />
<CHOICEELEMENT VALUE="7" CAPTION="College diploma/degree" />
<CHOICEELEMENT VALUE="8" CAPTION="University undergraduate
degree" />
<CHOICEELEMENT VALUE="9" CAPTION="Some post graduate university
study" />
<CHOICEELEMENT VALUE="10" CAPTION="Post graduate university
degree (e.g., Masters or Ph.D.)" />
</CHOICE>

<ROUTE CONTINUE="13.survey"/>
</SURVEY>
```

13.survey

```
<SURVEY TITLE="Snack food questionnaire">

<CHOICE MUSTANSWER="yes" NAME="school" CAPTION="What is the
highest level of education that you have completed?">
<CHOICEELEMENT VALUE="1" CAPTION="Never attended school" />
<CHOICEELEMENT VALUE="2" CAPTION="Grade school (grades 1 to 9)"
/>
<CHOICEELEMENT VALUE="3" CAPTION="Some high school" />
<CHOICEELEMENT VALUE="4" CAPTION="High school graduate" />
<CHOICEELEMENT VALUE="5" CAPTION="Post secondary trade or
technical school certificate/degree" />
<CHOICEELEMENT VALUE="6" CAPTION="Some university or college" />
<CHOICEELEMENT VALUE="7" CAPTION="College diploma/degree" />
<CHOICEELEMENT VALUE="8" CAPTION="University undergraduate
degree" />
<CHOICEELEMENT VALUE="9" CAPTION="Some post graduate university
study" />
<CHOICEELEMENT VALUE="10" CAPTION="Post graduate university
degree (e.g., Masters or Ph.D.)" />
```

```
</CHOICE>

<ROUTE CONTINUE="13.survey"/>
</SURVEY>
```

14.survey

```
<SURVEY TITLE="Snack food questionnaire">

<CHOICE NAME="income" CAPTION="What is your total household
income before taxes? (Note: Consider other residents part of
your "household" if you eat meals together.)">
<CHOICEELEMENT VALUE="1" CAPTION="Less than $10 000" />
<CHOICEELEMENT VALUE="2" CAPTION="$10 000 - $19 999" />
<CHOICEELEMENT VALUE="3" CAPTION="$20 000 - $29 999" />
<CHOICEELEMENT VALUE="4" CAPTION="$30 000 - $39 999" />
<CHOICEELEMENT VALUE="5" CAPTION="$40 000 - $49 999" />
<CHOICEELEMENT VALUE="6" CAPTION="$50 000 - $59 999" />
<CHOICEELEMENT VALUE="7" CAPTION="$60 000 - $69 999" />
<CHOICEELEMENT VALUE="8" CAPTION="$70 000 - $79 999" />
<CHOICEELEMENT VALUE="9" CAPTION="$80 000 - $89 999" />
<CHOICEELEMENT VALUE="10" CAPTION="$90 000 - $99 999" />
<CHOICEELEMENT VALUE="11" CAPTION="$100 000 or more" />
</CHOICE>

<ROUTE CONTINUE="15.survey"/>
</SURVEY>
```

15.survey

```
<SURVEY TITLE="Snack food questionnaire">

<TEXT MUSTANSWER="yes" NAME="height" CAPTION="What is your
height?" />

<CHOICE NAME=hunits MUSTANSWER="yes" CAPTION="Please select unit
of measurement" MULTI="no">

<CHOICEELEMENT VALUE="1" CAPTION="feet/inches" />
<CHOICEELEMENT VALUE="2" CAPTION="metres/centimetres" />

</CHOICE>

<ROUTE CONTINUE="16.survey"/>
</SURVEY>
```

16.survey

```
<SURVEY TITLE="Snack food questionnaire">

<TEXT NAME="weight" CAPTION="What is your weight?" />

<CHOICE NAME="wunits" CAPTION="Please select unit of measurement"
MULTI="no" >

<CHOICEELEMENT VALUE="1" CAPTION="pounds"  />
<CHOICEELEMENT VALUE="2" CAPTION="kilograms" />
```

```
</CHOICE>

<ROUTE CONTINUE="17.survey"/>
</SURVEY>
```

17.survey

```
<SURVEY TITLE="Snack food questionnaire">
<CUSTOM ESCAPED="no">

<h3>Thank you for your participation.</h3>

<p>To compensate you for the time you spent answering this
survey, we
would like to give you a gift <br>certificate. To receive your
gift,
please inform one of us that you have completed the survey.</p>
Please note that the warning labels seen in this survey were
created
by the researchers and not endorsed by <br>Health Canada in any
way.<br><br>

Please feel free to provide us with any comments you may have in
the space below.
</CUSTOM>

<MEMO NAME="comment"/>

<SEQUENCE SELFINCLUDE="yes">
<FILE FILENAME="consent.survey"/>
<FILE FILENAME="2.survey"/>
<FILE FILENAME="choice1-1.survey"/>
<FILE FILENAME="choice1-2.survey"/>
<FILE FILENAME="choice1-3.survey"/>
<FILE FILENAME="choice1-4.survey"/>
<FILE FILENAME="choice1-5.survey"/>
<FILE FILENAME="choice1-6.survey"/>
<FILE FILENAME="choice1-7.survey"/>
<FILE FILENAME="choice1-8.survey"/>
<FILE FILENAME="3.survey"/>
<FILE FILENAME="4.survey"/>
<FILE FILENAME="5.survey"/>
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<FILE FILENAME="9.survey"/>
<FILE FILENAME="10.survey"/>
<FILE FILENAME="11.survey"/>
<FILE FILENAME="12.survey"/>
<FILE FILENAME="13.survey"/>
<FILE FILENAME="14.survey"/>
<FILE FILENAME="15.survey"/>
<FILE FILENAME="16.survey"/>
<FILE FILENAME="17.survey"/>
</SEQUENCE>
</SURVEY>
```

Appendix C: Example Screen Shots of Electronic Survey

Features	Option A	Option B	Option C
Brand and Product	Baked! Lay's Original Potato Crisps	Cheetos® Puffs Cheese Flavoured Snacks	
Price	$1.25 for 60 g bag.	$1.75 for 60 g bag.	
Nutrition Facts	**Nutrition Facts / Valeur nutritive** Per 1 package (60 g) pour 1 paquet (60 g) Amount / Teneur — % Daily Value / % valeur quotidienne **Calories / Calories** 240 **Fat / Lipides** 8 g — 5 % Saturated / saturés 1 g + Trans / trans 0 g — 4 % **Cholesterol / Cholestérol** 0 mg — 0 % **Sodium / Sodium** 320 mg — 13 % **Carbohydrate / Glucides** 39 g — 17 % Fibre / Fibres 3 g — 14 % Sugars / Sucres 1 g **Protein / Protéines** 4 g Vitamin A / Vitamine A — 0 % Vitamin C / Vitamine C — 8 % Calcium / Calcium — 8 % Iron / Fer — 6 %	**Nutrition Facts / Valeur nutritive** Per 1 package (60 g) pour 1 paquet (60 g) Amount / Teneur — % Daily Value / % valeur quotidienne **Calories / Calories** 250 **Fat / Lipides** 22 g — 37 % Saturated / saturés 4 g + Trans / trans 0 g — 22 % **Cholesterol / Cholestérol** 4 mg — 2 % **Sodium / Sodium** 520 mg — 22 % **Carbohydrate / Glucides** 31 g — 10 % Fibre / Fibres 1 g — 4 % Sugars / Sucres 2 g **Protein / Protéines** 4 g Vitamin A / Vitamine A — 8 % Vitamin C / Vitamine C — 0 % Calcium / Calcium — 2 % Iron / Fer — 4 % Thiamine / Thiamine — 8 % Riboflavin / Riboflavine — 8 % Niacin / Niacine — 6 % Folate / Folate — 24 %	None.

I would choose

- ○ Option A
- ○ Option B
- ○ Option C (none)

Submit Clear

Figure C-1 Screenshot of choice experiment question with no warning label.

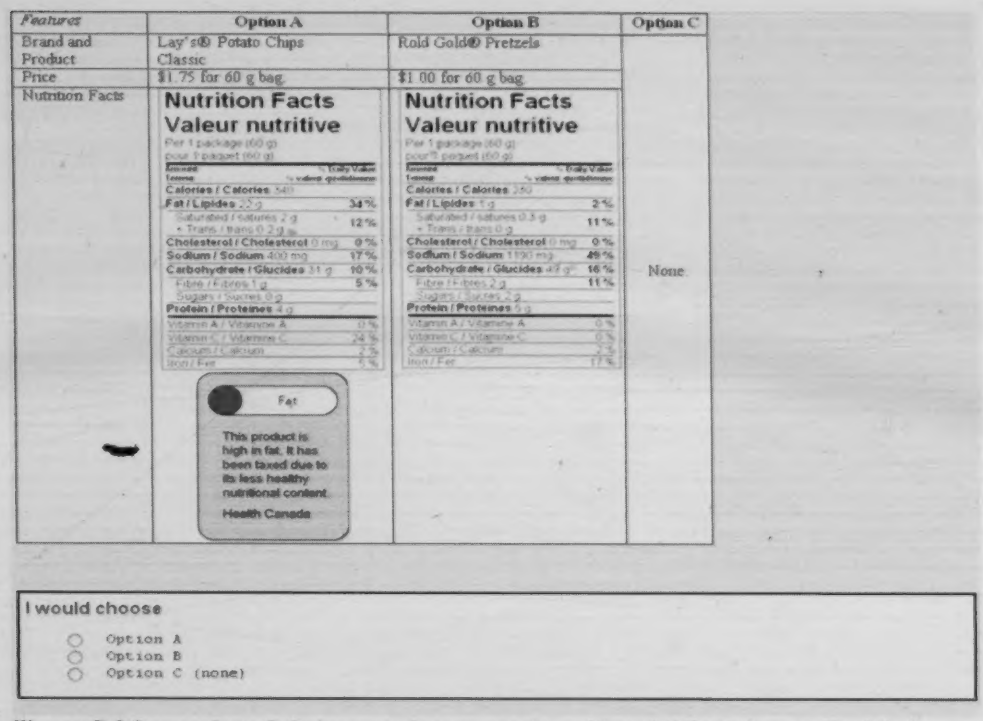

Figure C-2 Screenshot of choice experiment question with red light style warning label.

Appendix D: List of Descriptive Statistics

Table D-1 Variable Descriptions.

Variable	Description
INTERNAL	MHLC score representing how strongly a person feels that he or she is in control of her own health. Range: 6 to 36.
CHANCE	MHLC score representing how strongly a person feels that his or her health is a result of chance or fortune.
OTHERS	MHLC score representing how strongly a person feels that his or her health is controlled by the influence of other people (e.g. family, friends, and health care professionals).
EXERCISE	A score to represent exercise intensity. Scored based on the same scoring system as in the CCHS 2.2.
DIET	= 1 if the person has been advised by a health care professional to be watching his or her diet, 0 otherwise.
FEMALE	= 1 if female, 0 if male.
AGE	Age in years.
HOUSE	How many people live in household.
CHILDREN	How many people under the age of 18 live in household.
SCHOOL	How many years of education completed, starting in Grade 1.
INCOME	Household income before taxes.
BMI	Body mass index: weight / $(\text{height})^2$, units: kg for weight, m for height.
URBAN	= 1 if location of data collection is in an urban area (Edmonton and surrounding areas), 0 otherwise.
SAVEON	= 1 if the location of the data collection is in a Save On Foods supermarket, 0 otherwise.
LABEL	= 1 if the person reads Nutrition Facts labels almost always or more often than not, 0 if rarely or never.

Table D-2 Descriptive Statistics.

	N	Minimum	Maximum	Mean	Std. Deviation
INTERNAL	364	6	36	26.637	6.338
CHANCE	364	6	36	15.937	6.205
OTHERS	364	6	36	17.371	6.459
EXERCISE	361	.0	39.5	10.595	6.660
DIET	364	0	1	.33	.471
FEMALE	364	0	1	.79	.408
AGE	361	18	81	48.028	14.046
HOUSE	362	1	7	2.78	1.288
CHILDREN	364	0	5	.71	1.049
SCHOOL	364	.0	19.0	13.882	2.6593
INCOME	347	5000.00	105000.00	62608.069	31820.683
BMI	348	15.96	47.19	26.451	4.899
URBAN	364	0	1	.47	.499
SAVEON	364	0	1	.37	.482
LABEL	364	0	1	.76	.428
Valid N (listwise)	326				

Table D-3 Correlations (continued on next page).

		INTERNAL	*CHANCE*	*POWERFUL*	*EXERCISE*	*DIET*
INTERNAL	Pearson Correlation	1	-0.15491	0.019864	0.025973	-0.01483
	Sig.		4.69E-48	0.063373	0.015617	0.165627
CHANCE	Pearson Correlation	-0.15491	1	0.52607	0.10503	0.028804
	Sig.	4.69E-48		0	1.1E-22	0.007095
POWERFUL	Pearson Correlation	0.019864	0.52607	1	0.004085	0.208699
	Sig.	0.063373	0		0.70377	1.42E-86
EXERCISE	Pearson Correlation	0.025973	0.10503	0.004085	1	-0.07625
	Sig.	0.015617	1.1E-22	0.70377		1.19E-12
DIET	Pearson Correlation	-0.01483	0.028804	0.208699	-0.07625	1
	Sig.	0.165627	0.007095	1.42E-86	1.19E-12	
FEMALE	Pearson Correlation	0.069074	-0.08984	-0.09004	-0.12687	-0.06289
	Sig.	1.03E-10	4.01E-17	3.42E-17	2.01E-32	4.04E-09
AGE	Pearson Correlation	-0.06989	-0.10098	0.085485	-0.20438	0.300259
	Sig.	7.42E-11	4.41E-21	1.58E-15	1.06E-81	5.5E-180
HOUSE	Pearson Correlation	-0.07397	0.207592	0.077131	0.167969	-0.15579
	Sig.	5.08E-12	3.38E-85	6.06E-13	1.47E-55	2.48E-48
CHILDREN	Pearson Correlation	-0.04961	0.212419	0.087953	0.162227	-0.10058
	Sig.	3.5E-06	1.09E-89	1.79E-16	3.55E-52	4.35E-21
SCHOOL	Pearson Correlation	0.122381	-0.15803	-0.15582	-0.00865	-0.06104
	Sig.	1.66E-30	5.81E-50	1.32E-48	0.420728	1.13E-08
INCOME	Pearson Correlation	0.107521	-0.15228	-0.20317	0.030136	-0.1449
	Sig.	7.63E-23	2.19E-44	2.62E-78	0.006171	2.6E-40
BMI	Pearson Correlation	-0.01691	-0.01921	0.041952	-0.15353	0.307184
	Sig.	0.122183	0.079199	0.000126	7.44E-45	5.5E-182
URBAN	Pearson Correlation	0.000563	-0.02419	-0.09724	0.013349	0.040783
	Sig.	0.958015	0.023757	8.32E-20	0.214045	0.000137
SAVEON	Pearson Correlation	0.007724	0.002265	-0.05971	0.034543	0.017606
	Sig.	0.470409	0.832376	2.34E-08	0.0013	0.099872
LABELR	Pearson Correlation	0.046662	-0.06263	-0.05103	0.058151	0.085169
	Sig.	1.28E-05	4.67E-09	1.82E-06	6.07E-08	1.54E-15

Table D-3 Correlations (continued on next page).

		FEMALE	*AGE*	*HOUSE*	*CHILDREN*	*SCHOOL*
INTERNAL	Pearson Correlation	0.069074	-0.06989	-0.07397	-0.04961	0.122381
	Sig.	1.03E-10	7.42E-11	5.08E-12	3.5E-06	1.66E-30
CHANCE	Pearson Correlation	-0.08984	-0.10098	0.207592	0.212419	-0.15803
	Sig.	4.01E-17	4.41E-21	3.38E-85	1.09E-89	5.81E-50
POWERFUL	Pearson Correlation	-0.09004	0.085485	0.077131	0.087953	-0.15582
	Sig.	3.42E-17	1.58E-15	6.06E-13	1.79E-16	1.32E-48
EXSERCISE	Pearson Correlation	-0.12687	-0.20438	0.167969	0.162227	-0.00865
	Sig.	2.01E-32	1.06E-81	1.47E-55	3.55E-52	0.420728
DIET	Pearson Correlation	-0.06289	0.300259	-0.15579	-0.10058	-0.06104
	Sig.	4.04E-09	5.5E-180	2.48E-48	4.35E-21	1.13E-08
FEMALE	Pearson Correlation	1	0.140533	-0.10427	-0.18087	0.12109
	Sig.		1.84E-39	1.96E-22	3.87E-65	6.76E-30
AGE	Pearson Correlation	0.140533	1	-0.39745	-0.39313	0.010044
	Sig.	1.84E-39		0	0	0.349878
HOUSE	Pearson Correlation	-0.10427	-0.39745	1	0.74784	-0.10535
	Sig.	1.96E-22	0		0	7.17E-23
CHILDREN	Pearson Correlation	-0.18087	-0.39313	0.74784	1	-0.13851
	Sig.	3.87E-65	0	0		1.12E-38
SCHOOL	Pearson Correlation	0.12109	0.010044	-0.10535	-0.13851	1
	Sig.	6.76E-30	0.349878	7.17E-23	1.12E-38	
INCOME	Pearson Correlation	0.077677	-0.05022	0.145068	-0.00496	0.236687
	Sig.	1.26E-12	4.84E-06	3.52E-40	0.650619	2.2E-106
BMI	Pearson Correlation	-0.04679	0.134478	0.057874	0.027791	-0.05665
	Sig.	1.89E-05	1.02E-34	1.31E-07	0.011088	2.21E-07
URBAN	Pearson Correlation	0.026448	0.025027	-0.0845	-0.11001	0.090653
	Sig.	0.013434	0.019828	3.05E-15	6.21E-25	2.08E-17
SAVEON	Pearson Correlation	-0.05096	-0.02236	-0.08169	-0.1376	0.150943
	Sig.	1.88E-06	0.037423	2.43E-14	3.43E-38	1.1E-45
LABELR	Pearson Correlation	0.163158	0.22108	-0.07142	-0.12466	0.122477
	Sig.	3.51E-53	2.15E-96	2.65E-11	1.34E-31	1.5E-30

Table D-3 Correlations (continued).

		INCOME	*BMI*	*URBAN*	*SAVEON*	*LABELR*
INTERNAL	Pearson Correlation	0.107521	-0.01691	0.000563	0.007724	0.046662
	Sig.	7.63E-23	0.122183	0.958015	0.470409	1.28E-05
CHANCE	Pearson Correlation	-0.15228	-0.01921	-0.02419	0.002265	-0.06263
	Sig.	2.19E-44	0.079199	0.023757	0.832376	4.67E-09
POWERFUL	Pearson Correlation	-0.20317	0.041952	-0.09724	-0.05971	-0.05103
	Sig.	2.62E-78	0.000126	8.32E-20	2.34E-08	1.82E-06
EXERCISE	Pearson Correlation	0.030136	-0.15353	0.013349	0.034543	0.058151
	Sig.	0.006171	7.44E-45	0.214045	0.0013	6.07E-08
DIET	Pearson Correlation	-0.1449	0.307184	0.040783	0.017606	0.085169
	Sig.	2.6E-40	5.5E-182	0.000137	0.099872	1.54E-15
FEMALE	Pearson Correlation	0.077677	-0.04679	0.026448	-0.05096	0.163158
	Sig.	1.26E-12	1.89E-05	0.013434	1.88E-06	3.51E-53
AGE	Pearson Correlation	-0.05022	0.134478	0.025027	-0.02236	0.22108
	Sig.	4.84E-06	1.02E-34	0.019828	0.037423	2.15E-96
HOUSE	Pearson Correlation	0.145068	0.057874	-0.0845	-0.08169	-0.07142
	Sig.	3.52E-40	1.31E-07	3.05E-15	2.43E-14	2.65E-11
CHILDREN	Pearson Correlation	-0.00496	0.027791	-0.11001	-0.1376	-0.12466
	Sig.	0.650619	0.011088	6.21E-25	3.43E-38	1.34E-31
SCHOOL	Pearson Correlation	0.236687	-0.05665	0.090653	0.150943	0.122477
	Sig.	2.2E-106	2.21E-07	2.08E-17	1.1E-45	1.5E-30
INCOME	Pearson Correlation	1	-0.02067	0.187646	0.14613	-0.00131
	Sig.		0.064996	7.22E-67	5.61E-41	0.90495
BMI	Pearson Correlation	-0.02067	1	0.061477	0.015444	0.111756
	Sig.	0.064996		1.88E-08	0.158149	1.26E-24
URBAN	Pearson Correlation	0.187646	0.061477	1	0.815389	0.129884
	Sig.	7.22E-67	1.88E-08		0	3.53E-34
SAVEON	Pearson Correlation	0.14613	0.015444	0.815389	1	0.111697
	Sig.	5.61E-41	0.158149	0		1.17E-25
LABELR	Pearson Correlation	-0.00131	0.111756	0.129884	0.111697	1
	Sig.	0.90495	1.26E-24	3.53E-34	1.17E-25	

Appendix E: Spreadsheet Setup of Hypothetical Market

	A	B	C	D	E	F	G	H	I	J	K
2		cheetos	lays	doritos	dutch	rold gold	baked lays	sunchips	baked doritos	none	beta
3	cheeto	1	0	0	0	0	0	0	0	0	-0.866
4	lays	0	1	0	0	0	0	0	0	0	-0.296
5	doritos	0	0	1	0	0	0	0	0	0	-0.376
6	dutch	0	0	0	1	0	0	0	0	0	-0.697
7	rold gold	0	0	0	0	1	0	0	0	0	0
8	baked lays	0	0	0	0	0	1	0	0	0	0.2253
9	sun	0	0	0	0	0	0	1	0	0	0.4446
10	baked doritos	0	0	0	0	0	0	0	1	0	0
11	price	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	0	-0.367
12	BMI* price	=26 * B11	=26* C11	=26* D11	=26* E11	=26* F11	=26* G11	=26* H11	=26* I11	0	0.0123
13	w1	0	0	0	0	0	0	0	0	0	-0.7675
14	w2	0	0	0	0	0	0	0	0	0	0
15	pw1	0	0	0	0	0	0	0	0	0	0
16	pw2	0	0	0	0	0	0	0	0	0	0
17	incom e* price	=6.2 * B11	=6.2* C11	=6.2* D11	=6.2* E11	=6.2* F11	=6.2* G11	=6.2* H11	=6.2* I11	0	-0.026
18	ascc										-0.9846

	L	M	N	O	P	Q	R	S
2	B*K	C*K	D*K	E*K	F*K	G*K	H*K	I*K
3	=B3*K 3							
4		=C4*K4						
5			=D5*K5					
6				=E6*K6				
7					=F7*K7			
8						=G8*K8		
9							=H9*K9	
10								=I9*K9
11	=B11* K11	=C11*K11	=D11*K11	=E11*K11	=F11*K11	=G11*K11	=H11*K11	=I11*K11
12	=B12* K12	=C12*K12	=D12*K12	=E12*K12	=F12*K12	=G12*K12	=H12*K12	=I12*K12
13								
14								
15								
16								
17	=B17* K17	=C17*K17	=D17*K17	=E17*K17	=F17*K17	=G17*K17	=H17*K17	=I17*K17
18								

	X	Y	Z
2		v	market share
3	cheeto	=SUM(L3:L17)	=EXP(Y3)/(EXP(Y3)+EXP(Y4)+EXP(Y5)+EXP(Y6)+EXP(Y7)+EXP(Y8)+EXP(Y9)+EXP(Y10)+EXP(Y11))
4	lays	=SUM(M3:M17)	=EXP(Y4)/(EXP(Y3)+EXP(Y4)+EXP(Y5)+EXP(Y6)+EXP(Y7)+EXP(Y8)+EXP(Y9)+EXP(Y10)+EXP(Y11))
5	doritos	=SUM(N3:N17)	=EXP(Y5)/(EXP(Y3)+EXP(Y4)+EXP(Y5)+EXP(Y6)+EXP(Y7)+EXP(Y8)+EXP(Y9)+EXP(Y10)+EXP(Y11))
6	dutch	=SUM(O3:O17)	=EXP(Y6)/(EXP(Y3)+EXP(Y4)+EXP(Y5)+EXP(Y6)+EXP(Y7)+EXP(Y8)+EXP(Y9)+EXP(Y10)+EXP(Y11))
7	rold gold	=SUM(P3:P17)	=EXP(Y7)/(EXP(Y3)+EXP(Y4)+EXP(Y5)+EXP(Y6)+EXP(Y7)+EXP(Y8)+EXP(Y9)+EXP(Y10)+EXP(Y11))
8	baked lays	=SUM(Q3:Q17)	=EXP(Y8)/(EXP(Y3)+EXP(Y4)+EXP(Y5)+EXP(Y6)+EXP(Y7)+EXP(Y8)+EXP(Y9)+EXP(Y10)+EXP(Y11))
9	sun chips	=SUM(R3:R17)	=EXP(Y9)/(EXP(Y3)+EXP(Y4)+EXP(Y5)+EXP(Y6)+EXP(Y7)+EXP(Y8)+EXP(Y9)+EXP(Y10)+EXP(Y11))
10	baked doritos	=SUM(S:S17)	=EXP(Y10)/(EXP(Y3)+EXP(Y4)+EXP(Y5)+EXP(Y6)+EXP(Y7)+EXP(Y8)+EXP(Y9)+EXP(Y10)+EXP(Y11))
11	none	=K18	=EXP(Y11)/(EXP(Y3)+EXP(Y4)+EXP(Y5)+EXP(Y6)+EXP(Y7)+EXP(Y8)+EXP(Y9)+EXP(Y10)+EXP(Y11))